The Rubber Age

Published Monthly at East Stroudsburg, Pa.
Editorial and Advertising Offices: 250 W. 57th St., New York

Vol. 41 JUNE, 1937 No. 3

# INSTRUMENTATION in the Rubber Industry

By Reginald Trautschold, C.E.

ONLY by more exact methods of production control have the great improvements in quality and uniformity of product and economy of manufacture, which stamp the epoch-making advance of the rubber industry during the present century, been attained. Earlier methods of production control have been and are being replaced by automatic and semi-automatic systems, governed, guided and regulated by modern control instruments of utmost sensitiveness and precision.

True, a high degree of perfection in mechanical equipment and its operation has also been essential, but the one dominant movement has been in the instrumentation of the rubber mill. More and more dependence has been placed upon the guidance of fact-finding indicating and recording gauges for control over critical physical and chemical conditions and where stages in the production of the finished product have been standardized and resolved to cycles of related processes, the individual steps in the operations have not only been put under sensitive instrument regulation but the related processes are now being placed under systems of coordinated control. This advance has literally revolutionized production methods and effected almost unbelievable economies in manufacture.

While the initial steps in the preliminary stages of rubber manufacturing, *i. e.*, cracking and washing the raw crude rubber, may not present any great opportunities of cutting costs by the aid of instrument guidance, the drying of the crude rubber expeditiously, safely and economically, is promoted to a marked extent by the use of indicating and recording thermometers and humidity controls. When factory-washed rubber is dried, the removal of the moisture which collects on the surfaces of the rubber strips taken from the washing machines may be brought about most simply by circulating warm air through the chambers in which the rubber is suspended on racks.

For economical and even drying, however, the room air supply has first to be heated, by being forced through a duct over steam-heating coils; then tempered, by being mixed with fresh air before entering the drying chamber; and finally held in the drying chamber between predetermined temperature limits.

In the modern factory, close regulation of the drying air temperature is taken care of by a recording temperature-controller instrument actuating a damper arrangement governing the mixture of hot and cold airs, the flow of steam to the heating coils being automatically regulated by a diaphragm control valve in

the steam supply line, also operated by the controller instrument. A wet- and dry-bulb thermometer records the percentage of humidity and maintains an uninterrupted register of the complete drying cycle.

Where vacuum, *i. e.*, reduced pressure, drying of the washed crude rubber is resorted to, as in the preparatory steps in the manufacture of soft rubbers, similar control instruments are now quite generally employed, customarily with the addition of an indicating pressure gauge for guidance in maintaining the proper "vacuum". Ordinarily, the regulation of the vacuum pump is effected by hand control, but with the growing realization of economy in steam consumption made possible by automatic instrument regulation, it has been found that a diaphragm control valve manipulated by an air-operated pressure-controller provides much more economical and dependable regulation.

The continuous, uninterrupted records of temperature, vacuum and humidity conditions, when and as variations take place, which these instruments record with unfailing regularity, prove invaluable in establishing the one best drying cycle, in standardizing upon processing methods and uniformity in the rubber supply for subsequent curing undertakings.

A further refinement in drying the washed crude rubber is to employ rapid circulation of moderately warm air containing a controlled amount of moisture. A suction fan or blower forces the air through a water spray and over steam-heated coils and then, at comparatively high velocity, through the drying chamber. More uniform and thorough drying results, as the properly conditioned air penetrates rapidly through the mass of rubber, picking-up the entrapped moisture at the center without causing any over-drying of the outer rubber surfaces. The temperature and humidity conditions in this form of dryer are recorded and controlled as in the case of hot-air dryers.

### Compounding Room Instrumentation

In the mixing room where the washed and dried crude rubber is first masticated and then mixed with sulfur and various compounding substances in carefully predetermined proportions, the instrumentation of roll type mixers is now a recognized necessity in controlled rubber manufacturing. The proportioning and preparation of the ingredients to be added to the rubber and the feeding of these compounding materials are highly important considerations, of course, and many refinements having to do with these phases of compound mixing have admittedly been made. Nevertheless, instrumentation in even such a simple operation as mixing compounds in roll type mixers is growing, since it has proved a great convenience and is productive of economy in the use of the compounds and heating and cooling media.

In the roll mixer, for example, there is now a delicate problem in thermal control, introduced by exacting requirements in respect to plasticity, color shades and the use of accelerators, which affords opportunity of cutting compounding expenses to some considerable extent. Heretofore the temperatures of the rolls have not been deemed particularly critical and common practice has been to regulate the circulation of the hot or cold water through the rolls by the manual operation of control valves, as dictated by the "feel" of the rolls by the operator.

This hand test, however, is far from dependable and the hand operation of valves not sufficiently sensitive to avoid excessive and at times harmful temperature fluctuations. The element of time is also of considerable importance, for after sufficient mixing with the compounds, the sheet is removed, powdered and delivered to calender room or molding department.

In the modern Banbury mixer, which in effect is a refinement of the roll type mixer now used extensively for rubber compounding, instrumentation has been noticeably advanced by the application of a so-termed "process signal indicator and controller". Various colored lights appear at predetermined times to indicate when to add the various compounding ingredients and accelerators. Then, when the compounding has been completed, an alarm signal sounds and the mixer door automatically opens to discharge the load of compounded rubber. The door then closes automatically and the mixer is ready for another charge.

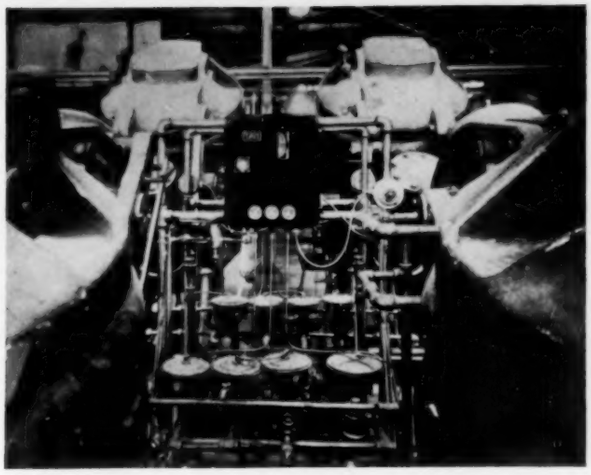
During this workmanlike cycle, the temperature of the rubber in the mixing chamber is closely regulated by circulating jacket water and a recording thermometer maintains an uninterrupted register of thermal conditions as they develop during the processing, accu-

Courtesy, Farrel-Birmingham Co., Inc.

**Instrumentation has been noticeably advanced by the application of the so-termed "process signal indictator and controller" with which this Banbury is equipped. Varicolored lights appear at pre-determined times to tell the operator when to add the miscellaneous compounding ingredients.**

Courtesy, C. J. Tagliabue Mfg. Co.

**Battery of tire mold presses, valve operations and curing lengths of which are controlled by automatic time cycle controllers.**



Courtesy, C. J. Tagliabue Mfg. Co.

**Close-up view of automatic time cycle controller and valves as well as part of two tire mold presses which it regulates.**

rately charting every variation in temperature and enabling the operator to meet exacting specifications in respect to plasticity and color shading, as well as to get the utmost from accelerators and the compounding ingredients. The charted records furnish information essential for duplicating compounding results for given batch specifications.

### Calendering Operations

Examples of like progress in temperature control of calendering operations are not as yet so common, for, while the importance of limiting the temperature range of the calender rolls is generally conceded, the customary practice is still simply to check roll heats at intervals with a portable thermo-electric pyrometer. Then, if the temperature of a roll is found to be excessive for the stock being calendered, cold water is allowed to flow through the roll; or, when the roll temperature is subnormal, steam is admitted, the valves controlling the cooling and heating media being manipulated by hand. In view of the pains taken to control temperatures closely in preceding and subsequent steps in the processing of rubber, this crude control in calendering is unquestionably responsible for lowering the quality of much rubber.

In some cases, where a continuous record of the temperatures of the rolls has been desirable, the bulb of a recording thermometer has been placed in a shoe riding against the roll. The temperature records thus obtained have proved decidedly helpful, serving as dependable guides in regulating the roll heats, in forestalling excessive fluctuations in roll temperatures, etc., but they still leave much to be desired in the way of sensitive control and close thermal adjustment in rubber calendering.

Automatic temperature controls, effected by recording thermometers actuating suitable control valves, have been applied in a few instances, although some difficulty, due to temperature lags in cooling and heating the metal rolls, has been encountered. This handicap is, however, far from insurmountable, as evidenced by the close temperature regulation now exercised automatically in modern textile calendering and in the even more exacting demands imposed in high-speed rayon and fine yarn slashing.

As pressure is brought to bear upon the rubber plants for even better and more uniform products, the economy of automatic temperature control in calendering will unquestionably become generally recognized and the hand roll-pyrometer tests discarded in its favor. Doing so will assure even better results than at present in rubber curing processing. That is, higher grade calendering will promote more economical vulcanizing and insure better rubber products.

### Vulcanization Control

In the all-important curing of rubber, in vulcanization control, decided progress, under the impetus of the unprecedented demand for tires and tubes, has been made in instrumentation, even now, and the coordination of process regulation under master controllers exemplifies advance of a truly revolutionary character, largely responsible for much lower manufacturing expenses and higher grade rubber products.

The standardized procedure in the operation of a modern tire or tube press consists of a specific cycle of related operations, as follows:

(1) Closing the heated press or mold.
(2) Applying steam, hot water or air under pressure inside tire or tube.
(3) Releasing pressure applied.
(4) Opening the mold for removal of cured product.

These operations are now being carried out and terminated on a definite time schedule, as well as in proper sequence, and, in advanced practice under the automatic direction of a governor, or master, controller.

The operation of these automatic cycle controllers of one general type is effected by the revolution of a controller cam, or series of cams, which are so proportioned that cam riders manipulate pilot air valves or make and break electrical contacts in accordance with a predetermined schedule, thus accurately controlling the timing of each of the operations governed by the controller. In another type of control instrument, electric clocks manipulate pneumatically actuated diaphragm valves in a similar manner, exercising automatic and coordinated regulation of time, temperature and pressure in vulcanizing processes. Comprehensive systems of coordinated process control have been developed in a number of cases and these can be explained best by brief descriptions of a few quite typical applications.

In one type of automatic electric-clock control, applicable to air bag, water bag and other curing meth-

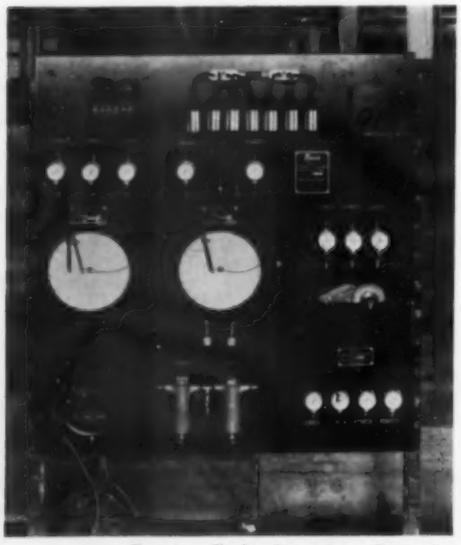
ods, the vulcanizer is loaded and closed in the customary manner, the heater tender then opens the hydraulic line and when the desired pressure is exerted on the ram, the curing cycle, automatically performed, commences. In air curing, to illustrate, air is admitted until the bags are suitably filled and then the air supply is cut off for a fixed period for an air test.

Should the air pressure drop more than a permissible amount during this test period, a red light appears and no further operations can take place until the cause of the excessive air loss is discovered and the leakage arrested. On the other hand, if there is no excessive pressure drop, the steam is automatically turned on for the curing period, during which the steam pressure within the vulcanizer is closely controlled and the condensate drained.

Just before the end of the cure, definitely timed, the controller automatically makes a second air leak test, the red light again appearing if an excessive air leak has developed during the cure. On this second leak test, however, the vulcanizing cycle is not necessarily interrupted and if the leakage has remained within allowable limits no signal is given. On completion of the curing cycle, the steam supply shuts off, cooling water is admitted to the vulcanizer, and the drain valve opens.

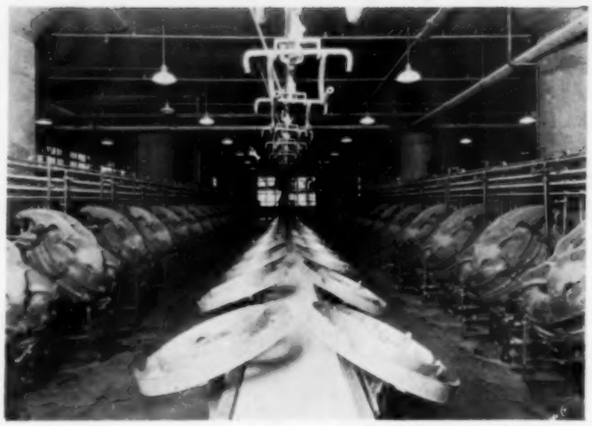
At the expiration of the timed cooling period, the water shuts off, the air supply to the bag is cut and the bags deflated—all automatically. A green light then signals the completion of the cure and it only remains for the operator to release the hydraulic ram pressure and unload the vulcanizer. The equipment then resets itself in the starting position for the next cure, which commences with the loading of the vulcanizer and the building-up of the hydraulic pressure on the ram.

In addition to controlling the processing cycle in this manner, recording instrument units maintain uninterrupted charted registers of temperatures and pressures. During the cure, regular short oscillations shown on the temperature graph indicate normal operating conditions; a smooth, maintained temperature graph shows that condensate and a considerable quantity of useful steam are discharging, a fruitful source of waste and inefficiency in steam utilization; while a constantly dropping temperature graph indicates obstruction to proper condensate drainage, a condition leading to non-uniform heat distribution in the vulcanizer and consequent ill effects on the product.



Courtesy, Taylor Instrument Companies

**Modern electric-clock control unit panel for tire vulcanizer which flashes red light when air pressure drops.**



Courtesy, Taylor Instrument Companies

**Battery of individual tube vulcanizers equipped with electric-clock time cycle controllers in a mid-western rubber factory.**

The application of this same general electric-clock control system to individual tube and casing vulcanizers is also quite illuminating. Several of these vulcanizers are connected to one steam header and so arranged that the molds are always at the curing temperature, necessitating accurate and close control over the time element. The closing operation—releasing the air to permit the closing of the mold, locking the cover, inflating the diaphragm to correct upper and lower mold requirements, and finally inflating the tube—and the opening operations—closing operations performed in the reverse order—have to be performed, consequently, expeditiously and automatically, so that there may be no variation to speak of in curing times.

A similar time-cycle-controller is also used on platen presses. At the beginning of the cure, the timer is in the starting position and the press open. The operator then presses a button and a valve functions to admit low hydraulic pressure to the press, closing it. Automatically, the high hydraulic pressure then comes on and the press is held closed for the required duration of cure; when the controller returns to the starting setting, the press opens and on unloading is ready for another curing cycle.

*(To be continued)*

## Flamenol Insulating Compound

UNDER the name of Flamenol, the General Electric Company, Schenectady, N. Y., has introduced a new synthetic insulating compound which is said to be entirely different from any insulation previously available. While similar to rubber in its characteristics, and put into solution for coating and impregnating as well as compounded, filled, calendered and extruded in much the same fashion, Flamenol contains no rubber and will not support combustion. It is reported to be highly resistant to moisture, acids, alkalis and oils and to have good aging and mechanical characteristics. Its properties permit it to be made into a very soft and flexible compound or one with celluloid-like rigidity. Flamenol-insulated cable is recommended for power and control circuits at 600 volts and less and for operation at a maximum copper temperature of 60° C.

# Writing Rubber Formulae

## Some of the Fundamentals to be Considered in Writing Rubber Formulae Whether on a Weight or Volume Basis

By F. N. Upham

THERE are two methods in use for writing rubber formulae; one is based on weight, the other on volume. If the percentages of the ingredients in a rubber formula are observed, it will be seen that some are small, while others are large. The accelerators (and their accessories) and the softeners are the small items, while the rubber, reclaim, reinforcers and fillers are the large items. It is evident from this that the small items are insignificant from a volume standpoint, while the large items are predominant from a volume standpoint.

As the formula contains two classes of ingredients which are not well adapted to manipulation on either a weight or volume basis only, a method combining both weight and volume is given, as follows: Write the formula on a weight basis, with all the ingredients except the filler and the dispersing agent, and compute the volume of each ingredient in per cent. Call this "A" for reference.

| *Weight* | "A" *Density* | *Volumes* | *Volumes %* |
|---|---|---|---|
| 100 lbs. Rubber | ÷ .93 = | 107.526 or | 95.483 |
| 4 lbs. Zinc Oxide | ÷ 5.6 = | .714 or | .634 |
| 3 lbs. Sulfur | ÷ 2.0 = | 1.500 or | 1.332 |
| 2 lbs. Stearic Acid | ÷ .9 = | 2.222 or | 1.973 |
| 1 lb. Accelerator | ÷ 1.5 = | .666 or | .591 |
| TOTALS | | 112.662 | 100.013 |

*Problem No. 1.* Using "A", write a formula containing 50% of rubber by volume, with whiting as the filler, and stearic acid as the dispersing agent, and compute the weight of the mill batch. As "A" contains 95.483% of rubber by volume then

$$\frac{100}{95.483} \times 50 \text{ volumes of "A"} = 52.36 \text{ volumes}$$

will be required to give 50 volumes of rubber. Multiplying all volumes per cent in "A" by $\frac{52.36}{100}$ gives

| | |
|---|---|
| 49.995 | volumes of Rubber |
| .332 | volumes of Zinc Oxide |
| .697 | volumes of Sulfur |
| 1.033 | volumes of Stearic Acid |
| .309 | volumes of Accelerator |
| 52.366 | volumes of "A" |

Subtract the sum of these volumes (52.366) from 100 to obtain the volume of whiting and dispersing agent. This gives 47.634 volumes. Using 2% of stearic acid on 47.634 volumes gives .953 volumes of stearic acid and 46.681 volumes of whiting. The two items of stearic acid, plus the 1.033 volumes as a softener for the rubber, and the .953 as the dispersing agent for the whiting, are now added—giving a total volume of 1.986.

Multiplying all these volumes by the specific gravity of each ingredient gives the formula on a weight basis, *i. e.*:

| *Volumes* | | *Densities* | *Weights* |
|---|---|---|---|
| 49.995 volumes | Rubber | × .93 = | 46.495 lbs. |
| .332 volumes | Zinc Oxide | × 5.6 = | 1.859 lbs. |
| .697 volumes | Sulfur | × 2. = | 1.394 lbs. |
| 1.986 volumes | Stearic Acid | × .9 = | 1.787 lbs. |
| .309 volumes | Accelerator | × 1.5 = | .464 lbs. |
| 46.681 volumes | Whiting | × 2.71 = | 126.503 lbs. |
| 100.000 | | | 178.502 lbs. |

$$\text{The specific gravity} = \frac{178.502}{100} = 1.78502.$$

To determine the weight of the mill batch, use the formula:

$$W = c \times d \times 62.4.$$

Where W = weight of mill batch, d = specific gravity of stock, c = capacity of mill batch in cubic feet, 62.4 = weight of one cubic foot of water.

In this case "W" is $2 \times 62.4 \times 1.78502 = 223$ lbs.

The maximum mill capacity can be found by mixing batches of varying sizes, and finding the maximum size which gives a satisfactory product. By transposing this formula, the maximum mill capacity can be computed from the formula

$$c = \frac{W}{62.4 \times d.}$$

and the "c" found used as a trial capacity for any other stock.

*Problem No. 2.* As a second example, write a formula containing 50% of whole tire reclaim, by volume, with whiting as the filler, and stearic acid as the dispersing agent, and compute the weight of the mill batch. Write the formula on a weight basis, with all the ingredients except the whiting and dispersing agent and compute the volumes per cent of all the ingredients, and call it "B" for reference.

| *Weight* | "B" *Density* | *Volumes* | *Volumes %* |
|---|---|---|---|
| 100 lbs. W. T. Reclaim* | ÷ 1.16 = | 86.206 or | 97.068 |
| 2 lbs. Zinc Oxide | ÷ 5.6 = | .357 or | .402 |
| 1½ lbs. Sulfur | ÷ 2.0 = | .750 or | .845 |
| 1 lb. Stearic Acid | ÷ .9 = | 1.111 or | 1.250 |
| ½ lb. Accelerator | ÷ 1.5 = | .333 or | .372 |
| TOTALS | | 88.757 or | 99.937 |

* The quantities of zinc oxide, sulfur, stearic acid and accelerator in this formula are calculated for a reclaim which is one-half rubber.

As "B" contains 97.07 volumes per cent of whole tire reclaim, then $\frac{100}{97.07} \times 50 = 51.50$ volumes of "B" will be required to give 50 volumes of reclaim. Multiplying all volumes per cent in "B" by $\frac{51.50}{100}$ gives the following:

49.986 volumes of W. T. Reclaim
.207 volumes of Zinc Oxide
.435 volumes of Sulfur
.644 volumes of Stearic Acid
.192 volumes of Accelerator

51.464 volumes of "B"

Subtract the sum of these volumes (51.464) from 100 to get the volume of the whiting and dispersing agent, *i. e.*, 48.536. Using 2% of stearic acid computed on 48.536 gives .971 volume of stearic acid and 47.565 volumes of whiting. The stearic acid .644 volumes used as softener and .971 volumes used as dispersing agent are now added, giving a total of 1.615 volumes. Multiplying all these volumes per cent by the specific gravity of each ingredient gives the formula on a weight basis, *i. e.*:

| *Volumes* | | *Densities* | | *Weights* |
|---|---|---|---|---|
| 49.986 | × | 1.16 | = | 57.984 lbs. |
| .207 | × | 5.6 | = | 1.159 lbs. |
| .435 | × | 2.0 | = | .870 lbs. |
| 1.615 | × | .9 | = | 1.484 lbs. |
| 47.565 | × | 2.71 | = | 128.902 lbs. |
| 99.808 | | | | 190.369 lbs. |

The specific gravity is $\frac{190.369}{99.808} = 1.91$

The mill batch weight is $2 \times 62.4 \times 1.91 = 238$ lbs.

*Problem No. 3.* As a third example, write a formula containing 25% of rubber by volume, and 25% of whole tire reclaim by volume, using whiting as a filler and stearic acid as the dispersing agent, and compute the weight of the mill batch.

Using formula "A" for the rubber $\frac{100}{95.483} \times 25$ volumes = 26.18 volumes of "A" will be required. Multiplying all volumes in "A" by $\frac{26.18}{100}$ gives

24.997 volumes of Rubber
.166 volumes of Zinc Oxide
.349 volumes of Sulfur
.155 volumes of Accelerator

26.184 volumes of "A"

Call this "C" for reference.

Using formula "B" for the reclaim, $\frac{100}{97.97} \times 25 =$ 25.75 volumes of "B" will be required.

Multiplying all volumes per cent in "B" by $\frac{25.75}{100}$ gives

24.995 volumes of Reclaim
.104 volumes of Zinc Oxide
.218 volumes of Sulfur
.322 volumes of Stearic Acid
.096 volumes of Accelerator

25.735 volumes of "B"

Call this "D" for reference.
Add "C" and "D" giving

24.997 volumes of Rubber
24.995 volumes of Reclaim
.270 volumes of Zinc Oxide
.567 volumes of Sulfur
.839 volumes of Stearic Acid
.251 volumes of Accelerator

51.919 volumes of "C" and "D"

Subtract the sum of these volumes (51.919) from 100 to obtain the volume of whiting and dispersing agent, *i. e.*, 48.081. Using 2% of stearic acid computed on 48.081 gives .962 volumes of stearic acid and 47.119 volumes of whiting. The total stearic acid is now .839 volumes used as softener, plus .962 volumes used as dispersing agent, giving 1.801 volumes.

Multiplying all these volumes by the specific gravity of each ingredient gives the formula on a weight basis, *i. e.*:

| *Volumes* | | *Density* | | *Weight* |
|---|---|---|---|---|
| 24.997 volumes | × | .93 | = | 23.247 lbs. |
| 24.995 volumes | × | 1.16 | = | 28.994 lbs. |
| .270 volumes | × | 5.6 | = | 1.512 lbs. |
| .567 volumes | × | 2.0 | = | 1.134 lbs. |
| 1.801 volumes | × | .9 | = | 1.621 lbs. |
| .251 volumes | × | 1.5 | = | 2.636 lbs. |
| 47.119 volumes | × | 2.71 | = | 127.692 lbs. |
| 100.000 | | | | 186.836 lbs. |

The specific gravity is $\frac{186.836}{100} = 1.87$.

The mill batch weight is $2 \times 62.4 \times 1.87 = 233$ lbs.

In writing a formula proceed in the following order:

(1) Determine whether it is to be made from
  a. all new rubber.
  b. all reclaim.
  c. a mixture of rubber and reclaim.
(2) Determine the quantities of (1) to be used, and express as per cent of volume.
(3) Determine the type of accelerator, whether slow, moderately fast, or fast.
(4) Determine the softeners to be used and their quantities.
(5) Determine the dispersing agents to be used and their quantities.
(6) Determine the amount of zinc oxide required to activate the accelerator.
(7) Determine the quantity of sulfur to be used.
(8) Determine the reinforcers or fillers to be used, remembering that formulae containing low volumes of rubber or reclaim are more easily loaded with filler than reinforcers, and that formulae of high rubber content are generally not compounded or compounded with reinforcers.
(9) Reclaim will not carry as much loading as new rubber, as it is already loaded.
(10) Unless there is a very good reason for inserting an ingredient in a formula, leave it out altogether.

## Vulcaplas—New Plastic Material

AN oil-resistant, odorless, vulcanizable plastic, called Vulcaplas, has been developed and introduced by Imperial Chemical Industries, Ltd., Millbank, London, S.W. 1, England. Like the synthetic rubbers, such as neoprene, Vulcaplas is a new raw material and is supplied only as a straight, uncompounded product. Unlike neoprene, however, it does not itself possess the elongation and tensile strength of natural rubber. Vulcaplas is thermoplastic and is not recommended for use under working conditions where temperature exceeding 70° C. may be encountered. The importance of this new material to the rubber industry is said to lie in the fact that it may be mixed with either natural or synthetic rubber to give compounds with outstanding resistance to oils and solvents, allied with normal rubber-like qualities. In addition to being odorless itself, Vulcaplas does not give off any objectionable fumes during processing, according to Imperial engineers.

# The Selection, Instruction and Training of Men

## An Outline of Some Methods Used by Goodrich with Particular Emphasis Laid on the Foreman

By T. G. Graham
Vice-President, B. F. Goodrich Co.

IN outlining my ideas regarding the selection and training of men, I should like to make clear that I am naturally thinking in terms of the most practical plan that we know of in our plant. In the rubber industry the great majority of production jobs are relatively unskilled and may be mastered by the average man without previous training or experience in at the most 36 days. Certain semi-skilled jobs such as tire building and calender operation require longer learning periods, but they do not require that a man have any previous specialized training or experience. These unskilled workers and semi-skilled workers make up the large part of our working forces; skilled mechanics and craftsmen are required in relatively small numbers.

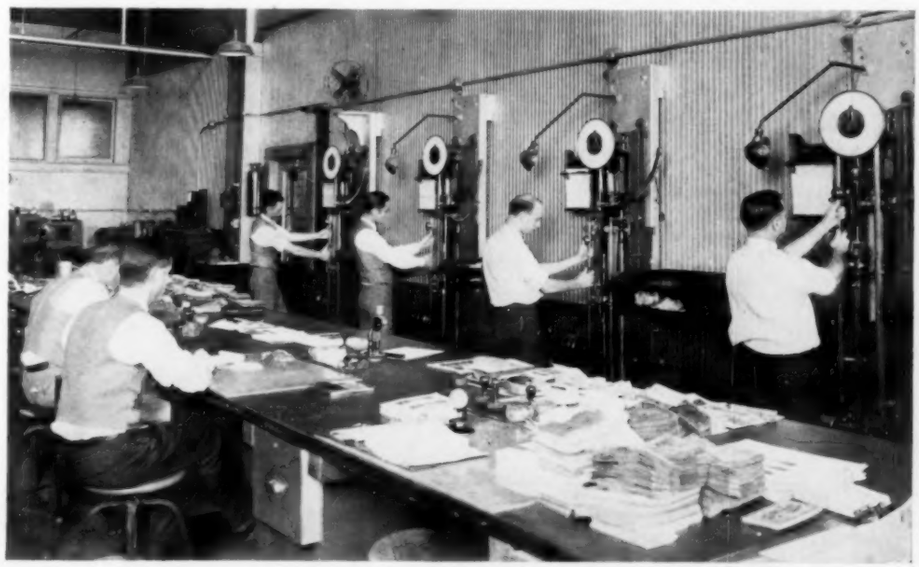
The methods of selection and training which appear to be most practical in our plant may differ from those most suitable for other plants. There should be little basis for disagreement on the methods used, however, as long as the common result which we must all seek is attainable through these methods. With this in mind, we may proceed with our discussion with little chance for misunderstanding.

There are two basic points in this matter of proper employee selection. First, the selection should attempt always to fit the man to the job rather than to fit the job to the man. Second, the person or persons responsible for the selection of employees should be given the total responsibility for the selection. They should be unhampered by the whims and personal desires of plant executives, foremen, and others who are apt to place friendship and personality at too high a premium in employee selection.

The Employment Department must work in close cooperation with the production organization, but it must be given a free rein to select men on a strict basis of merit. In order to do this, the employment interviewer must have a full knowledge of the job which he is trying to fill. This knowledge must be complete and accurate. It must be acquired in close cooperation with the production organization, and it must be progressive knowledge. Employment specifications must keep pace with changing job conditions. Over a period of years, our employment interviewers, working with our production organization, have built up a set of comprehensive specifications for the jobs for which they must hire.

These specifications have been built up through a lengthy and continuous process of checking the human requirements of the production jobs in the various departments. Standards are established on the basis of the combined judgment of the foreman and the Labor Department; employees are selected to fit these standards; and a careful check is maintained to prove or disprove the correctness of these standards by observing the performance of the employees selected. Through this process of testing these standards by at-

This paper was presented at the 8th Annual Convention, Greater New York Safety Council, held in New York City, on April 13-15, 1937.



Battery of tensile testing machines in the Physical Test Laboratories of the B. F. Goodrich Company, at Akron. Foremen are required to understand the workings of these testing devices as they are all other angles connected with rubber manufacturing whether under their immediate atention or not.

tempting their practical application, the specification is gradually built up to include only those qualifications which have been proved practical and necessary.

This same principle of checking against practical experience must be maintained continuously in order that the job specification may be currently practical. Changing production methods, product changes, and even social and economic changes, all tend to render certain parts of our job specifications obsolete. In recent years we have found it necessary to tighten up on the physical requirements of our specifications because of the seniority program under which we operate. Under this program it is sometimes necessary to transfer employees from jobs requiring minimum physical qualifications to other jobs which may require at least an average physique. This possibility must now be recognized in our selection of practically all new employees. It is just as important that we keep our specifications up-to-date as it is that we originally establish such specifications.

### Experience Is Only Safe Basis

Experience is the only basis upon which we may satisfactorily establish and maintain our employment standards and specifications. A typical job specification will show: (1) The duties of the job; (2) The qualifications necessary, including general education, technical knowledge, previous experience, physical requirements, height, weight and health; (3) Other essentials, such as accuracy and carefulness; (4) Features of the job—clean, dirty, outdoor work or indoor work; (5) Related jobs—other jobs which this employee might be required to do; and (6) Type of job, *i. e.*, individual or group work.

The following specifications for three representative jobs in our plant—a boring mill operator, a mill man, and a stock supplier for tire builders—are practical illustrations of the information now at the disposal of our employment interviewers.

JOB TITLE: OPERATOR, BORING MILL

*Duties:* Operate boring mill, to face, turn and form all kinds of metals; set up job by securing material to table by clamps; level and align job and set tool in head properly; must be able to read blue-prints and be familiar with the use of precision measuring tools; set up and grind tools properly. (In rubber machine shop, must be able to rough and form tire molds and all rubber manufacturing equipment, according to specifications).

*Qualifications:* Education — common school education and shop mathematics. Technical Knowledge—ability to analyze blue prints, drawings and specifications; ability to grind tools properly. Experience—as a rougher, six to fifteen months experience on boring mill; as a finisher, three years experience on boring mill. Physical Requirements—height—medium, tall; weight—medium, heavy; good health and physique. Other essentials—accuracy, carefulness.

*Features of Job:* Clean, when working on steel; dirty, when working on cast iron; hot, flying chips at times.

*Related Job:* Vertical turret lathe; horizontal boring mill; horizontal milling machine.

*Type of Job:* Individual operation.

JOB TITLE: MILLING MAN (MIXING MILL)

*Duties:* To perform the various functions attendant to mixing the various rubbers, chemicals, and other materials on mills of various sizes from 32 to 84 inches; these functions are mainly breaking down the rubber materials ready for addition of pigments, adding the pigments and then blending the combinations; attendant work, such as proper care of the finished mixed stock, tallies, care of machines, etc., are part of his duties; his knowledge of the work must be such as to be able to interpret instructions relative to the above.

*Qualifications:* Education—common school education or equivalent. Technical Knowledge—none. Experience—none. Physical Requirements—height—medium, tall, 5 foot, 9 inch minimum; weight—medium, heavy, 160 pounds minimum; must be well proportioned and must have good shoulders, arms and hands. Other essentials—must have no fear of machinery.

*Features of Job:* Dirty and dusty, hot, heavy.

*Related Job:* Warm-up milling.

*Type of Job:* Individual work.

JOB TITLE: SERVICING TIRE MACHINES

*Duties:* Secure proper fabrics and treads for tires being produced; place these materials in machines in proper sequence and order so that they are available to the tire builder as required; place proper identification marking on treads.

*Qualifications:* Education—some high school, graduate preferred. Technical Knowledge—none. Physical Requirements—height—medium, tall; weight—medium, heavy, must be well proportioned, not too heavy or bulky, and must have exceptionally good hands and arms. Other essentials—requires high degree of mental alertness and ability to work rapidly and under pressure at times.

*Features of Job:* Clean, quiet.

*Related Job:* Stock supply pool or tire building job is next step in promotional plan.

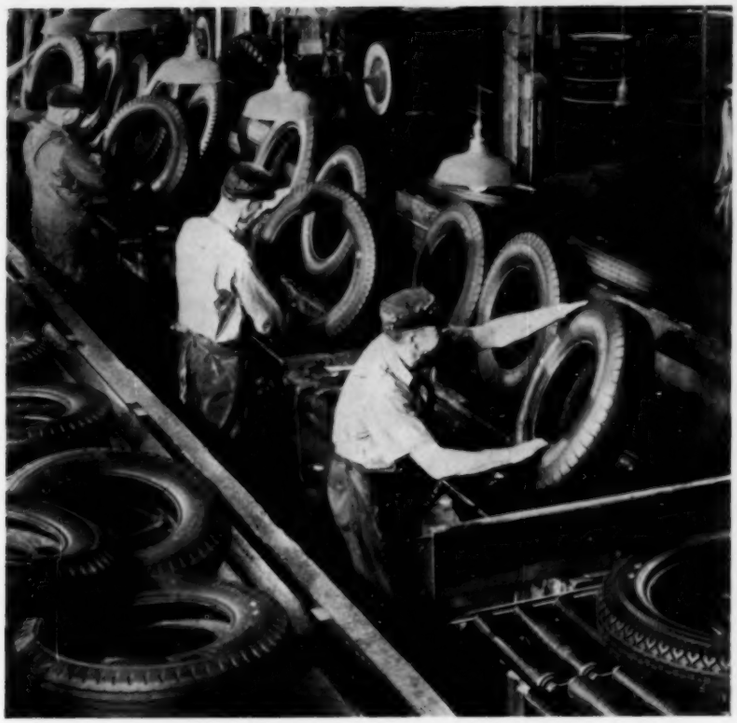
*Type of Job:* Individual work, but in close cooperation with tire builders.

With these specifications as the basis for selection, the employment interviewer then goes about his task of finding the man for the job. The man to be selected must be fitted to the job. This naturally suggests that the interviewer's task will be to learn to know the man as fully and accurately as he has already learned the job.

We depend largely on the personal interview in securing this necessary information on the qualifications and experience of the applicant. The skilled interviewer is generally able to secure an adequate knowledge of the man through the use of a carefully planned and alert series of questions. If the questioning is skillful, the possibility of any mis-statement of fact not being detected is very small.

### Flaws Detected in Interviews

Recently a man applied at our employment office for a job requiring special mechanical training and skill. This man had all of the appearances of a well qualified workman. He was able to answer the technical questions asked of him in an intelligent manner. He had seemingly the proper background, education, training, and experience. As a final caution before hiring this man, the interviewer inquired as to the normal amount of his daily production on the machine he was to operate. This final question proved to be his downfall for he quoted a figure some 500% higher than that which we consider a fair day's work. Caught up at this point, the man admitted that he had had no experience on the work, but that he had been coached by a friend in order that he might get by the interviewer. We had to admit that the friend had been a good coach—but as is usually the case in every deliberate deception, one flaw was allowed to remain in an otherwise perfect plan. Our experience has been that these flaws can generally be detected in the hiring interview.



**Above: Placing "water bag" for drum-built tire in a vacuum box to shape it properly.**

**Right: Goodrich inspectors examining tires which reach them in a never-ending stream.**

Over and above the task of determining the technical, educational, and physical qualifications of the man for the job, the selection must also take into consideration the moral and social qualifications of the prospective employee. It must be determined that he is a steady worker. He must be of good moral habits. He must have a worthwhile reason for wanting to make good on the job. He must be of the type that will fit well into the organization.

Probably the best method of appraising these more or less intangible qualifications is that of carefully checking the man's past record and his present status in the community. His references should come in for a careful examination. Every available means for securing facts on which to base this appraisal should be made use of. The applicant's previous employers can often furnish valuable data in this regard. The records of our schools and colleges may supply information regarding the applicant who has had no previous employment. Other social and economic units with which the man has been identified may frequently be the source of other facts pertaining to the applicant's past record as a member of society. Here again, we feel that past experience is the most practical basis on which to estimate the future actions of the applicant.

Regardless of the methods used in interviewing and selecting employees, it seems to be of particular importance to keep always foremost the fact that our job is to select a man who is fitted for the job and the organization. It is much easier and much more practical to fit the man to the job than to attempt to rebuild the job and the organization to fit the man.

### Training Employees

Training naturally follows selection. Here, the question as to just how far industry's responsibility in training employees extends may logically be raised. It is my opinion that the training of workers by industry should be closely coordinated with the established educational facilities of the community. An industry should undertake training which conflicts with that being done in our school systems only when the training in our schools is not adequately preparing workers for that industry, or when such training is not available to its employees. It is wasteful for an industry to carry on elaborate programs for training new employees in specialized jobs when properly trained workers are available. Likewise an individual has no basis for expecting an industry to hire him and train him in certain skills when such training can be secured satisfactorily in our school systems.

There is, however, a real place for training and education in industry. As a matter of fact, there is a large field for training in almost any industry—so large as to make it all the more important that we avoid duplication of effort with our schools.

The inexperienced and unskilled worker must be trained to perform his job. He must also be trained to fit into the organization of which he is becoming a member. Even the skilled mechanic who has spent years in training must be assisted to orient himself to the new organization. The experienced employee must be given the benefit of training that will help him to handle his job in an up-to-date manner. Only through training can we build and maintain a flexible working force.

A great deal has been written during recent years relative to the training of employees. If all of these writings were boiled down, they probably could be summed up in the statement, "Tell the employee what to do, show him how to do it, and help him until he is able to proceed on his own".

It seems to me that there are two phases of this training problem which faces industry that merit more of our consideration than the phase of job training; that is, telling him how, showing him how, having him do the job and checking his performance. Most industries are well able to develop their workers to an efficient production basis within a reasonable amount of time. We know of no better method of accomplishing this than the one just stated. The phases which I have uppermost in my mind and about which I should like to speak more fully are those of:

1. Induction of the new employee.
2. Follow-up or the continued training of the experienced worker.

We should be rapidly approaching the realization that the only way in which an employee can be satisfactorily introduced to his job and his company lies in a direct and strict application of the "Golden Rule". If an employee is to secure our viewpoints and is to enter into our organizations with the attitude which we believe desirable, we must first place ourselves in a position of understanding his viewpoints and attitudes. It is fundamental with all of us to wish to be known and dealt with as individual human beings, important for our own worth. We might well ask ourselves, just how we should like to be handled if we were entering a new organization. Where would our interests lie? Most likely we should want to know:

1. That we were looked upon as individuals; not just as cogs in a machine.
2. That we were being hired to do a job which was necessary for the proper functioning of the organization.
3. How the job for which we were being hired tied in with the workings of the organization and why it was really necessary.
4. The compensation we should expect to receive and when we should receive it.
5. The hours of work and conditions of work.
6. To whom we were to be responsible.
7. Those company policies which would affect our welfare — not a big build-up about the wonderful company for which we were to work. We'd come to form our opinion of the company through our experience in it.
8. The people with whom we were to work.
9. What was expected of us.

If this is what we should want, it is also what the other fellow wants. Our whole employment procedure from the original interview on through the Medical Department, the Personnel Department, and on into the Production Department should be set up to meet these wants in a satisfactory manner. Our procedure should fully care for these wants, but it should not be so slow or deliberate as to try the new employee's patience. After all, he came to our plant to work and the sooner he gets at it, the better he will like it.

### Importance of Safety Instruction

Nothing specific has been said relative to safety instruction. We have been talking about what the new employee wants. Does the new employee really appreciate specific and detailed instructions regarding safety? Unless the job for which he is being hired is particularly hazardous, we doubt it. Nevertheless, the importance of and necessity for proper and adequate safety instruction is not diminished by the new employee's attitude. It does suggest, however, that these instructions must be imparted in an indirect manner. Who wants to be told that he must work safely? After all, don't we, every one of us, try to work and live safely, or at least, don't we think that we do? The approach to safety in our introduction must be carefully planned to suggest to, rather than to tell, the new employee the importance of safe work habits *to him*.

Too often most of us are prone to consider our training job completed after we have crammed the employee full of company policies, safety rules, etc., and he has responded by the regular production of the desired quality and quantity of work. Why should we be so optimistic as to believe that a short and intensive period of training will satisfactorily mold the employee for all future time to come? How may we be sure that the employee will remain a satisfactory and a satisfied employee? The only answer to this question seems to be continuous training — the follow-up.

This training most frequently, from necessity, has to be confined to the employee's work place. Consequently, the major part of the training job must rest with the foreman. The foreman, because of the very nature of his work and the conditions under which he must operate, is limited in his approach to the problem. His approach must be indirect; his teachings largely through setting an example. He should, through the proper conduct of his job, come to be the recognized leader, teacher, and counselor for his people. When new production methods are installed his people should look to him naturally for teaching and advice in adapting themselves to new methods. When a company policy is revised, his people should expect and secure from him an authoritative interpretation and explanation of the revision in policy. Whenever an employee wishes advice or aid in any of his problems, the foreman should be the one to whom he first thinks of appealing.

### Foreman Must Continue Training

At these times, and at all other times as he goes about his daily tasks, the foreman must continue this job of training — training for better methods, safer practices, improved understanding, etc. He must do this largely through suggestion, explanation, and example. It, therefore, seems logical that we may best accomplish the continuous training of our employees by training our foremen in the methods of better foremanship. To the extent that foremanship training is effective we may expect the training of our employees to continue in a progressive manner.

In some instances, the foreman's part in the training process may be supplemented by either formal or informal educational work of a class-room nature, in which the employee takes an active part. Lectures, discussions, clinics, etc., on matters of safety, quality, production methods, and company policies can in most cases be of considerable aid to the foreman in molding and preserving a satisfactory and a satisfied employee. The extent to which these formal activities may be carried on to advantage will depend upon conditions and policies peculiar to the industry concerned.

In our plant we have placed the greatest emphasis on foremanship training. All of our foremen and supervisors have been organized into small conference groups which meet weekly during the fall and winter months of each year. At these meetings the foremen are kept up-to-date with the trends of efficient foremanship and with the current situation in our plant relative to policy, production, safety and employee welfare.

Our direct workers are also invited to organize themselves into conference groups for the discussion of policies, methods, and other matters of general interest. A small number of our employees have availed themselves of this opportunity. A larger number of our employees have for the past several years taken part in an evening school which is conducted in our plant under the auspices of our local university. These employees have studied English, Psychology, Mathematics, Public Speaking, and similar subjects.

A program for training trade apprentices has also

*(Continued on page 184)*

# ELECTROFORMING in the Making of Molds and Dies

By J. Gilbert Malone, Sc.D.

THE use of the process of electroforming in the making of dies is not new. It was this process that made the phonograph record industry possible. These dies were for the most part made of copper and the application of copper to other fields suffers from its many limitations. Even the production of dies in iron and iron alloys such as will be described in this paper is not new. Dies for bank notes were long constructed by such a process in old Russia and in Vienna. The Russian process was extremely sensitive, very laborious and very slow. It was a laboratory curiosity and not a production tool.

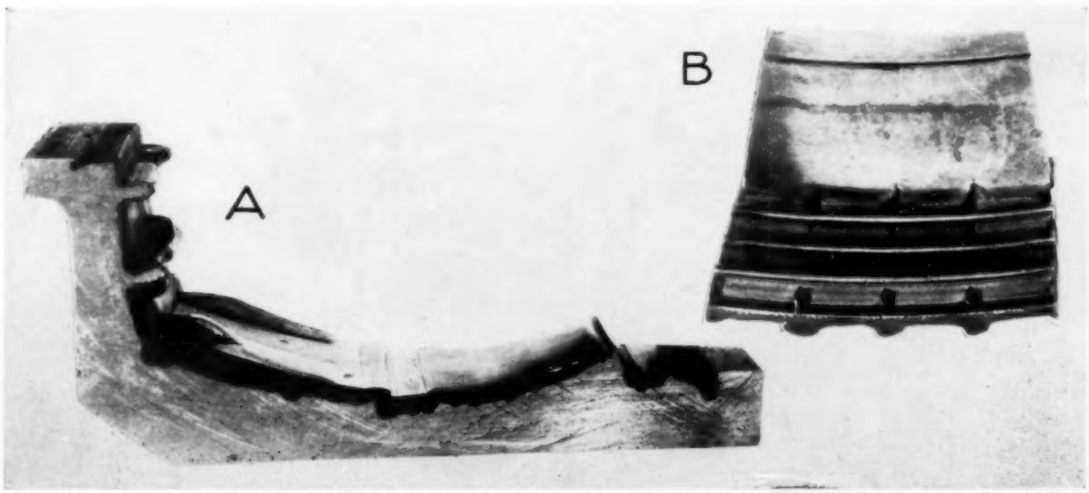
The author discovered the fundamentals necessary for the deposition of a high quality iron at a relatively high rate approximately two years ago. Since that time application has been and is being made of the process to the production of molds and dies for the rubber, plastic and die casting industries. Undoubtedly the greatest single field at the present time, due to the volume, is in the production of tire molds. It is not, however, the one where the greatest unit savings may be effected. From the standpoint of the savings effected per unit of manufactured article, the plastic industry stands to benefit most by this development.

These dies, as manufactured, may appear like a straight engraved and machined job, as may be seen from the photograph. Their construction is, however, that the engravings is contained in the electroformed face, which may be as thick as is thought necessary for the use of the mold. The thinner this electroformed face, the lower the cost, particularly in the time required to produce it in the bath. That is to say, a 1/16-inch shell may take 24 hours while the 3/16-inch takes 72 hours of forming time.

This shell is made into a mold by backing it up with molten metal or welding to a steel plate, finally machining to give the external dimensions required. It need hardly be pointed out that the greatest advantages of the method will be found in the cases where the mold cavity would require the greatest amount of work in the older practice. Thus, any amount of engraving is transferred as easily as if it were not there. On the other hand, it has no point of preference where the cavity can be made by a few operations on a lathe or boring mill. It should also be pointed out that the electroformed shell can be welded with a surprisingly small amount of distortion.

The process is a method of reproducing and a master must be constructed by some other process. This master model may be constructed of any imaginable material such as modelling clay, plaster, wood, rubber, metal, etc. Natural surfaces can be reproduced also, such as the grain of wood, leather, etc. Given the master model, a negative is reproduced by means of the soft low-temperature-melting Cerrobase (an alloy produced by the Cerro de Pasco Copper Corporation, New York City) and upon the Cerrobase the working master is produced in iron by deposition. This iron working master is the exact duplicate of the master model, lines ruled 7,000 to the inch reproducing clearly.

From this working master any number of dies may be made. These dies will have all the detail (in-




Courtesy, Cerro de Pasco Copper Corp.

**A—Section of electroformed tire mold without cast backing. B—Section of same electroformed mold with aluminum backing.**

cluding imperfections) of the original master model. As a matter of routine practice it is best to have an engraver remove any imperfections from the working model that carried over from the master and also to have it highly polished, a procedure best done on the iron rather than on many materials of the original master. The die will then have the high degree of polish necessary for plastic work. The final die may be hardened by a suitable treatment.

The above procedure is a satisfactory one which may be generally applied. In most cases it may be considerably shortened. Allowing for delays, a schedule of 10 days from master model to finished die may be maintained.

Iron and iron nickel dies offer great promise in several fields. Besides the increased rate and economy of production, certain effects can be reproduced which cannot practically be obtained in any other way; the grain of Morocco leathers, for example. Diffraction gratings, those curiosities of the physics laboratory, which flash the colors of the rainbow, may be reproduced, transferred to dies, and hence to the plastics molded in them. Such plastics break white light into its rainbow colors and flash with particular brilliance in direct light. Perhaps we are on the threshold of abandoning pigmentation and capturing the subtle iridescent hues so renowned in the insect world!

## Parafilm—A Latex-Base Material

A NEW MATERIAL—termed Parafilm—which uses latex as a composition base and which is finding new applications in a variety of fields, has been developed by the Marathon Paper Mills Company and is being currently merchandised by the Menasha Products Company, Menasha, Wisconsin, an affiliated concern. There are several grades and types of Parafilm available.

Grade "F" Parafilm, available in an assortment of colors, has found wide application in the florist trade as a wrapper for corsages, stems, boutonnieres and bouquets. Since water cannot harm the material and it makes corsages, bouquets, etc., stem-stain proof by keeping the moisture in the stem, it is proving popular in this field. This grade of Parafilm is fast-working, self-sealing and highly decorative.

Grade "G" Parafilm, which is innerwound with kraft paper and is highly adhesive, is being used by nurseries as a grafting tape. It is said to adhere quickly to grafts and although offering complete protection to the graft it is still flexible enough to prevent girdling. Grade "M" of this material is transparent and uncolored. This type is used as a heat-sealing mounting material. It mounts charts, maps, drawings, photos, blueprints, etc., to cloth, paper, wood, metal and other surfaces. When hot-pressed between pieces of paper, cloth, glass or other similar mounting backgrounds it produces a strong, waterproof seal, according to Menasha.

One of the more established uses for Parafilm is found in Grade "C". This is used as a wrapper for natural cheese and has opened a new market for such cheese by affording a convenient, no-waste package. The cheese is placed in the Parafilm wrapper when freshly made and the wrapper closely pressed on it. The cheese cures in the wrapper, thus preventing moisture loss, rind growth and mold growth. Several hundred thousand pounds of Wisconsin cheese are now packed in Parafilm every month and are available in five-pound loaves and in smaller proportions in principal metropolitan markets.

Still another type of this material, Parafilm-coated paper, is finding application in the packaging of foods which require high moisture protection as well as flexibility for machine operation and heat-sealing qualities. The paper is coated with a substance substantially the same as the Parafilm sheet to produce a high moisture-proof material which can be heat-sealed, using the Parafilm coating as a sealing surface. Parafilm may also be used as a laminating adhesive between two sheets of paper or other material to produce a moisture-proof, yet pliable, laminated sheet.

Parafilm, best described as a flexible, thermoplastic, waterproof sheet material, is supplied in rolls innerwound with paper to prevent expansion. Menasha Products advises that as fast as the company can survey new markets, plan production and begin sales they are entering such markets.

## Expanded Uses of Pliofilm

THE advantages of Pliofilm, the rubber-base material developed by Goodyear, over various forms of cellulose acetates, are rapidly expanding its uses in a number of industries. Recently, the firm of

**Pliofilm Rain Cape**

Richards, Boggs and King, of Chicago, introduced a Pliofilm rain cape. In addition to this use, the material has also been adapted for men's coats and jackets, aprons, umbrellas, shower caps and curtains, dress hanger covers, garment bags, furniture covers, make-up bibs, tobacco pouches, mattress covers, quilt covers, oxygen tents, theatrical garments and curtains, lamp shade covers and casket covers.

Pliofilm's transparency, combined with the fact that it is waterproof, odorless and non-inflammable, is said to be the reason for its wide-spread adoption. It is also extremely light, resistant to acids, oils and alkalis, and paper-thin. Comparable to cellophane in general appearance, it is available in a variety of colors, will not tear easily, may be pieced together for making odd shapes by either sewing or heat treatment and will not crack or dry out. Its waterproofness is derived from its rubber base.

Ultimately, the greatest market for this rubber-base material is expected to result from its use as a package wrapping material, particularly for perishable foods for refrigerator storage, according to Goodyear.

# Drying Machinery Development

## Wide-Spread Use of Latex Has Led to Development of Several New Drying Machines and Vulcanizers

PRACTICALLY every process in the production of rubber articles has evaporation or heat transfer as a basis. Within recent months there have been several improvements in evaporation and drying apparatus, this development being attributed, in the main, to the rapidly increasing use of latex in the rubber industry as well as other industries which are turning to latex as a valuable adjunct in the production of improved products. Several of these new machinery developments have been pioneered by the Spooner Dryer and Engineering Co., Ltd., Ilkley, Yorks, England.

All of the Spooner machines depend for their efficiency on the splitting up of air streams and maintaining the velocity of these streams to their maximum effective limits. Another feature in their design is that these machines are constructed in comparatively small units so that a machine of any capacity can be built up or added to by increasing the number of units which comprise a single machine. Although the conveying, loading and tentering devices of these machines follow accepted practices, the apparatus for heating and drying, or a combination of both, have been markedly improved.

For instance, two machines have been developed for use in the drying of latex when used for coating fabrics. The larger of these two (Figs. 1 and 2) is used for treating fabrics at a speed up to 40 yards per minute for light fabrics, with heavier fabrics running at correspondingly slower speed. The latex is applied and spread through a standard spreading head, while the material is taken through the machine on pin chains and held at full width throughout its passage. The material to be dried first passes through a chamber in which jets of steam are projected over the entire surface through a peculiar-shaped nozzle by means of a fan. That portion of the steam which is not absorbed by the cloth is returned to the fan and re-used. Heating of the material in the steam chamber before it passes into the drying section of the machine makes it easier to absorb the moisture content and obviates the tendency of case-hardening.

After leaving the steam chamber, the material passes through three double drying sections, in each of which a stream of air operates, and is fully dried by the time it emerges from the third section. The outer casing for this machine, which consists of steel-framed panels, is insulated against heat losses. Several of the panels are hinged to provide ready access to internal units if necessary. It is reported that a consumption of steam as low as 1½ pounds per pound of moisture removed has been obtained with this machine.

The smaller of these two machines for latex-treated fabric has only two sections, although a third may be added when needed. Each section incorporates a drying chamber in which the stream of air is split up into finely divided sprays by means of a nozzle arrangement, this action resulting in high evaporative efficiency and uniformity of drying. The drying chambers are fed with air from fans. Each fan circulates the main volume of air through a section and is equipped with an auxiliary runner which supplies a predetermined percentage of air into the circuit.

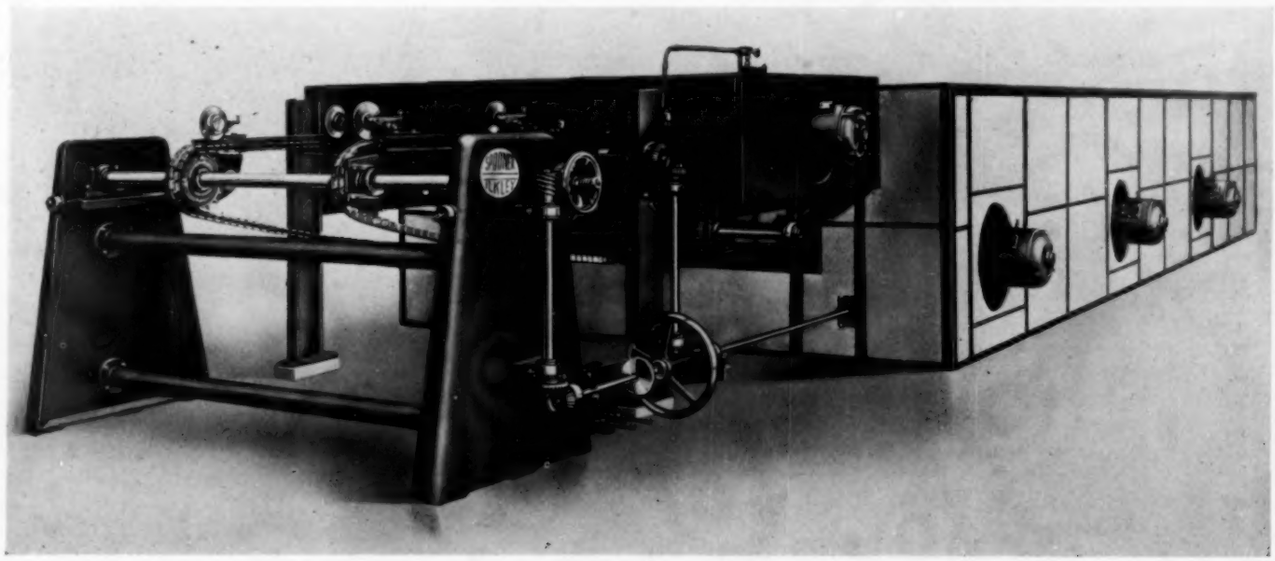
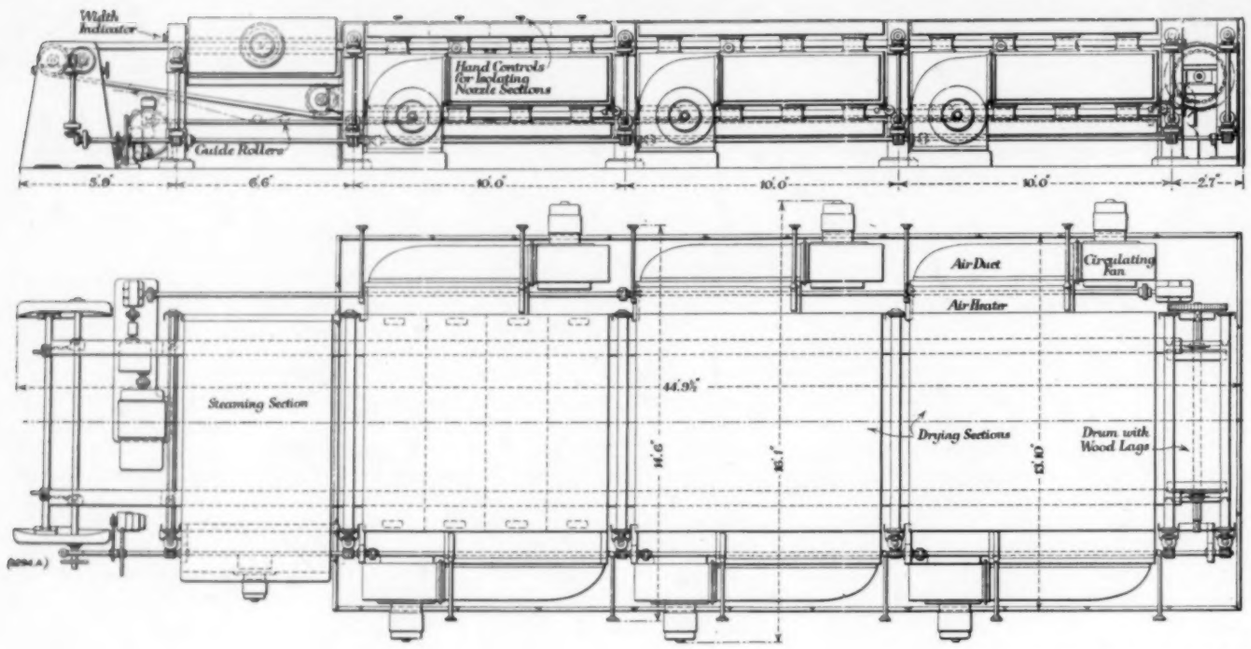


FIG. 1—Reproduction of large drying machine for latex when used for coating fabrics.




Courtesy, *The Engineer*, London

**FIG. 2—Diagram of large drying machine for latex when used for coating fabrics.**

When necessary the air drawn into this auxiliary runner may be controlled by means of a valve which can be regulated to suit the temperature at which the machine is required to operate. An air heater and an air filter are part of the fan circuit. The heater is of the "gilled tube" type and is designed to meet the steam pressure available. The filter acts to catch the impurities in the air within the circuit.

Although both of these machines have been primarily designed for drying latex they may be adapted for the continuous vulcanizing process with simple modifications. Built for temperatures up to 400° F. using high pressure and superheated steam in the air heaters, the air pressure may be sufficiently increased for effective vulcanizing. Because of the small dimensions of the machines it is possible to use a neutral gas in place of the air so that any possible oxidizing effect is eliminated.

In cases where available space is limited and chains are not required, a machine built in vertical form has been made available and obviously has specific advantages. This type is built in sections up to 20 feet in height, the width of the machine approximating only 5 feet. One of the prime advantages of this construction is that there are fewer rollers over which the material is carried (the two top rollers being driven, the bottom ones serving only as guides). This machine also furnishes even heating, or drying in the case of the latex drying machine, and has small steam consumption on low power.

Spooner has also recently introduced a new type of festoon dryer or vulcanizer (Fig. 3) in which the material is carried through the machine in festoons carried on bars. These bars, in turn, are taken through the machine on chains. Advantages claimed for this type of construction include the small amount of space required owing to the same principle applied in the design of the single pass machine, although the air streams cannot be maintained at the same high rate of velocity.

At the bottom of this dryer there is a pressure chamber for the hot air which is kept in circulation by a fan situated at the top of the machine. The hot air is fed through the same nozzle arrangement found on the other apparatus described and circulates through the steam heater. In the illustration is shown a special unit of this dryer on which doors have been fitted so that a length of material can be enclosed if the vulcanizing process requires slowing up.

Another model of this festoon dryer is available for vulcanizing rubber articles of irregular shape. In this type, the articles are mounted on specially-designed trays and the air currents are maintained at a high velocity and are evenly distributed over the entire surface so that a very high and rapid heat transference is obtained.

In vulcanizing by direct contact with a hot platen the temperature is raised in a reasonably short time by the pressure applied to the material. This calls for comparatively little machinery ingenuity. But in cases

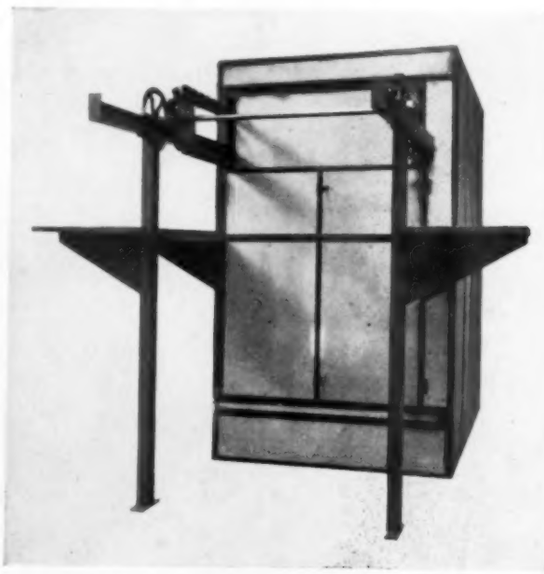


**FIG. 3—New type of festoon dryer or vulcanizer.**

where air or gas currents must be adopted, then the design of the machine is all-important, since it must be such that the air or gas passes over the entire surface of the material or product involved with high and uniform velocity. If such uniformity is not obtained then heating is both slow and irregular.

According to Spooner engineers, comparatively few rubber chemists realize that the time factor in the heating up process has retarded the use of the air or gas vulcanizing process. They predict that now that heat transfer may be obtained evenly and quickly over a surface this process will come more widely into use.

Certain rubber compounds vulcanize quickly, and with such mixtures no special precautions need be taken. When a slow vulcanizing mixture is used, however, then air currents cannot be used since the oxidizing effect is too great. In the case of the machinery described the air or gas is held in a closed circuit and therefore it is possible to use $CO_2$ or nitrogen as an inert gas where no oxidizing takes place.

These considerations led to the development of a machine consisting of two separate sections, the material first passing through one of the sections, which may be either vertical or horizontal in shape, in which the air streams are maintained at the highest possible velocity, and when the material has reached the predetermined temperature passing into the second section in which the same temperature is maintained and in which vulcanization is completed. In both of these sections $CO_2$ can be used instead of air to avoid oxidization. In the second section in which the temperature is evenly maintained, the air streams, no matter how slowly they are set to move, spread uniformly at all times. If pockets of dead air were allowed to occur they would tend to lower the temperature and cause uneven vulcanization.

Spooner has also developed an evaporative part of a spreading machine for treating rubber coated matrials of the standard type which embodies this same principle. The evaporative portion consists of a section the outer casing of which is constructed of steel framing in which asbestos-insulated doors are fitted. Inside this casing are two evaporative chambers, one above and the other below the material, with nozzles attached to each other. A fan circulates the gas within the chambers through a heater in similar manner to other circuits described, but above the upper chamber is a trunk connected to a fan which draws the solvent-laden air out of the chamber. The fan is of sufficient strength to prevent the air within the chamber (which evaporates the solvent) from becoming an explosive mixture.

An alternative to this system is a section with closed ends which is fed by $CO_2$ or nitrogen so that the mixture within the chamber is unexplosive. This method makes possible regaining of the solvent without any appreciable drop in temperature so that the usual losses from such regeneration methods are eliminated.

# Development of Rayon in Tires

REASONS leading to the experiments and development of rayon cord in bus and truck tires were outlined by W. A. Gibbons, director, development department, U. S. Rubber Products, Inc., at a recent meeting in Detroit sponsored by the Detroit District Committee of the American Society for Testing Materials, and reproduced in the April, 1937, issue of the *A.S.T.M. Bulletin*. The more pertinent remarks of Mr. Gibbons with regard to rayon in tires follow:

Pneumatic heavy service tires have certain requirements in carcass strength. These requirements have been met with the use of the best possible cotton making the strongest possible cord. As carrying capacities and cross sections of tires increase, carcass strength requirements likewise increase. It is the practice of the industry to meet these requirements with an increasing number of plies. There is a limit, however, to changes in this direction. As carcass thicknesses are increased, the heat generated through deformation of the tire in service also increases; likewise compression and extension strains on the internal structure are materially increased.

With the best engineering practice known, it was being realized more and more that eventually stronger materials and materials having greater fatigue capacities would have to be developed if tire engineering was to keep itself abreast of automotive engineering and the development of super-highways. Several years ago, chemists brought forth their first attempt to develop a rayon yarn for use in tires, and like most developments of this kind, early attempts were not successful. Today, however, sufficient progress has been made to warrant the use of a cord made from rayon as a substitute for the cotton cords universally used. At its present stage of development, rayon yarn being used for tire cord is from 50 to 100% stronger than the common commercial variety of rayon. This strength is obtained without sacrifice of the very necessary flexibility required in tire cord.

In comparing the relative merits of cotton and rayon cord, it is necessary to consider the fact that the moisture-strength relationships of the two materials are entirely different. A cord made of cotton becomes materially weaker as it loses its moisture, while a cord made of rayon becomes materially stronger. It is necessary also to give consideration to a difference to their density. A rayon cord is somewhat more dense than a cotton cord. In the development of rayon tires, advantage has been taken of these relatively favorable characteristics.

The use of rayon cord presented a rather difficult problem from the standpoint of obtaining adequate adhesion between its surface and the rubber insulating materials of the carcass. The difficulties have very definitely been overcome and the present tires are entirely adequate in this respect. Modifications of latex adhesive solutions which have been in use for a considerable number of years form a base for the solutions now in use in rayon tires.

It should be realized that the development is still in the early stages and, while extremely successful tires have been developed, the ultimate possibilities in rayon have not yet been achieved. A super quality tire has been produced, but demonstrations of its super quality can be made only under extremely severe service conditions.

The growth of this important development is dependent on several factors. At present, rayon tire cord of suitable quality is materially higher in cost than even the most expensive cotton cord. Experience only will answer the question as to what portion of the total heavy service tire usage will require its superior qualities. The trend toward super-highways, high-speed bus operations, and to high-speed long distance freight haulage seems to indicate that eventually there will be an increasing demand.

## Rubber in Coal Handling

COAL is handled at several stages during its length of life from mine to consumer use. Breakage of the coal at any one or more of these stages results in a depreciation of the value of the commodity. Therefore, it was to be expected that considerable research has been conducted to devise ways and means of reducing breakage possibilities to a minimum at the various transportation steps where such breakage is more apt to occur, particularly at loading or unloading points.

Several years ago Messrs. Wilkinson Rubber Linatex, Ltd., of England, created a number of anti-breakage chutes featuring linings of specially compounded rubber. A series of service tests resulted in improved chutes which, according to the company, are rapidly being put to use by coal companies throughout the world. A typical installation is that recently made by the London Midland and Scottish Railway for their general terminal plant at Glasgow, Scotland.

This installation consists of a lined hopper and a series of fabric-reinforced rubber flanged tubes, each tube being 3 feet, 6 inches in diameter, total length of the complete anti-breaking device measuring 25 feet. The lining consists of a number of Linatex tubes, each 1-inch in thickness and strengthened internally with special proofed fabric to prevent stretching. Steel ring flanges are used to attach the tubes both to the hopper and to each other. Between the flanges of the tubes are Linatex baffles which are really the vital portions of the equipment.

### Method of Controlling Tension

The tail end of the anti-breaking device consists of a diaphragm of 1-inch thick rubber, slit to form eight sections. Along the center line of each section and underneath is a solid rubber bracket, the metal-shod end of which projects through a suitable slot in the wall of the Linatex tube, thus holding the bracket firmly in position. Through holes provided in these metal-shod ends are threaded suitable sized Linatex tension cords by which the resistance of the baffles to the flow of coal is controlled. Tension is readily and quickly varied by means of this control and once the correct degree of tension is secured the device needs no further adjustment.

As the coal enters the lined hopper at the top of the anti-breaker, the controlled baffles keep it flowing centrally. When exceedingly large lumps of coal are encountered the brackets under the baffles bend easily and, in this installation, can provide an opening fully 3 feet in diameter, equivalent to the size of the tubes.

Simple in design, the improved rubber-lined, anti-breaking coal device (which is also adaptable to other hard materials) requires no skilled attention since there are no mechanical parts. The lower tubes are fitted with swing bolts so that they may readily be removed or replaced if longer or shorter tubes are required. Its design offers a minimum of wind resistance, said to be an important factor when coaling in heavy winds. Due to the hose-like delivery, coal can be delivered through circular manholes, common on small ocean vessels.

In its entire passage through the coal anti-breaker, the material comes in contact only with the resilient rubber lining so that there is a minimum of noise. The tubular construction plus the reduction of breakage practically eliminates former dust troubles.

## Waterproofing Pile Fabrics

THERE are a number of processes for waterproofing pile fabrics, several of which incorporate the use of rubber. Those of the latter type, as well as several others, are capably and briefly described by T. Ridd in a recent issue of *American Dyestuff Reporter* in an article on the subject. Warning that precaution must be taken in using such processes, especially those incorporating latex, a comparatively recent entry into the field of textile proofing, because of the complicated patent situation, the author makes it clear that processes he describes are all protected.

The use of rubber for waterproofing pile fabrics is confined to the rubberizing of the backing only since a deposit of rubber on the pile fibers would cause serious clotting. The rubber mix, or "dough" as it is termed in the trade, is applied to the backing of pile goods by means of spreaders, the fabric passing in open order between a rubber roll and the blade of an iron doctor set at a suitable distance above the roll. The required amount of dough is distributed across the width of the cloth, being subsequently leveled to form an even coating during the passage of the fabric under the doctor.

### Several Curing Procedures

When the fabric leaves the doctor it passes through a heated tunnel in order that the solvent in the mix may evaporate. Several coats of rubber are given in cases where it is desired to develop a non-skid surface, according to Mr. Ridd, such as in hearth rugs or floor mats or for material to form imitation turf for indoor golf and tennis "greens."

After dusting on talc or starch powder, if the adhesiveness of the rubber coating must be reduced, the material is ready for curing. If the deposit of rubber is a light one, then a cold curing process with sulfur chloride is adopted; if a heavy one then it is cured by the application of dry heat or treated with live steam. The cold cure is not suitable for heavily rubberized pile fabrics because the solution of sulfur chloride fails to penetrate a stout coating of rubber.

In cases where the use of heat at temperatures over 100° C. is detrimental to the goods, as in the instance of material with acetate rayon pile, curing of the rubber is either conducted at a temperature somewhat below that figure or else the operation is performed at normal atmospheric pressure. In order to achieve an efficient cure without the use of heat, an ultra-accelerator is employed in place of an accelerator of the ordinary type, according to the author.

It is generally known that the presence of copper salt in a rubberized fabric is detrimental to efficient curing, particularly if the cure is carried out by the cold method. Copper salts exert a powerful catalytic effect on the rubber vulcanizate, oxidation and eventual degradation of the rubber. It is therefore essential that copper salts be not utilized as dyeing or after-treating assistants for textiles which require rubberizing.

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### To Owners of Noble's "Latex in Industry"

**The author has prepared an addenda and errata list which represents not only errors in patent numbers and typography but which includes a number of references originally omitted from the book. This list, in printed form which may be readily pasted into the original copy, is available without cost to all purchasers of the book. Address requests to THE RUBBER AGE, 250 West 57th Street, New York City.**

# First Pneumatic Rubber Tire

## Although Thompson's Patent Specified a Leather Casing His Tire Was Essentially Pneumatic Type

By P. W. Barker

ROBERT W. THOMPSON, a civil engineer, of Adelphia, England, patented the first pneumatic rubber tire, for carriages, in England on December 10, 1845, as No. 10,990, and in the United States, on May 8, 1847, as No. 5,104. Specifications for both patents have been examined, and they appear to be identical.

Despite the fact that Thompson used a leather casing, protected with metal rivet-heads, his tire was essentially a pneumatic rubber tire. It was vulcanized, for vulcanization had been discovered in 1839 by Charles Goodyear and subsequently patented by Thomas Hancock and Alexander Parkes, in England, in 1844 and 1846.

### Quotations from Thompson's Patent

Quotations from the United States patent perhaps will serve better than any other means to describe Thompson's pneumatic tire:

"The nature of my said invention consists in the application of elastic bearings round the tires of the wheels of carriages for the purpose of lessening the power required to draw the carriages, rendering their motion easier, and diminishing the noise they make when in motion. I prefer employing for the purpose a hollow belt composed of some air and water tight material, such as sulphurized caoutchouc or gutta-percha, and inflating it with air, whereby the wheels will in every part of their revolution present a cushion of air to the ground or rail or track on which they run.

"The elastic belt is made as follows: A number of folds of canvas saturated and covered on both sides with sulphurized india-rubber or gutta-percha in a state of solution are laid one upon the other and each fold connected to the one immediately below it by a solution of india-rubber or gutta-percha or other suitable cement.

"The belt thus formed is then sulphurized by immersion in melted sulphur or exposure to the fumes of burning sulphur, which renders it more pliable and prevents it getting stiff on exposure to cold; or the belt may be made of a single thickness of india-rubber or gutta-percha in a sheet state and sulphurized as aforesaid, and then inclosed in a canvas cover.

"A strong outer casing in which to hold the elastic belt is then built up (so to speak) around the tire by riveting together a series of circular segments of leather and bolting them to the tire. A pipe, through which to inflate the elastic belt with air, is passed at one place through the tire of the wheel and fitted with an air-tight screw-cap.

"I prefer distending the elastic belt with air, as being more suitable than anything else for the purpose; but it may be distended with various solid substances of an elastic quality—as, for instance, metallic springs, sulphurized pieces of caoutchouc, or gutta-percha, or horse-hair or sponge."

Thompson's "Traction Wheel," patented in 1847.

Thompson even thought of the tire flap: "and in some cases, where the nature of the roadway frequent concussions are likely to take place, a flat strap or band of sulphurized caoutchouc or gutta-percha or other suitable elastic substance of the width of the tire and about half an inch in thickness might be interposed between the tire of the wheel and the elastic belt, so as to render it less liable to rupture in the event of its being jammed between the roadway and the tire."

### Additional Ideas of Inventor

Other ideas of Thompson concerning the pneumatic tire were nine inner tubes instead of one, inner tubes built in separate segments each with valve stem, and the use of his "bearings" as he called them for bath chairs, rocking-chairs, and other like articles used commonly in amusement parks and within doors.

Hancock and Macintosh had of course used solid rubber tires on carriages in 1845, if not earlier; but it was not until 1888 when John Boyd Dunlop, an Irishman, patented the first pneumatic bicycle tire, that the pneumatic rubber tire began to supplant the solid tire. Pneumatic tires for automobiles came after 1888, some say first Edouard Michelin, one of the brothers who founded the great French Michelin company, and others claim the honor for various United States rubber manufacturers in 1895 and 1896. This point, however, had best be left for another day.

## Stretched Chilled Rubber

RUBBER becomes hard and opaque at low temperatures and is then said to be "frozen" or "boardy." In this state it exhibits most of the phenomena associated with true crystallization. During work on "frozen" crude rubber at the laboratories of the National Bureau of Standards it was noted that stretched samples behaved in a curious manner. Further investigation revealed additional strange behavior of crystallizing samples, some of which are reported by W. Harold Smith and Charles P. Saylor, members of the Bureau, in the February 19, 1937, issue of *Science*. These reactions, which follow herewith, may possibly have some special significance in explaining the "rubbery" state.

When a piece of crude rubber, for example, a strip about 5mm. wide and 2 mm. thick, is stretched moderately, cooled to —25° C., and maintained at that temperature, it first becomes hard and then during a few hours the length of the stretched piece increases about 4%. A strip of rubber, stretched and nailed to a board, rises to form an arc between the point of attachment. This secondary elongation is roughly independent of the amount of stretch if the increase in length has been between 20 and 300%. We have observed it with smoked sheet, pale crepe, milled pale crepe and with smoked sheet that has been swelled slightly by benzene to remove strains, and thoroughly dried. It is absent or feeble with vulcanized rubber or with rubber that has been stretched to the degree at which it displays marked resistance to further elongation. The elongation does not occur with unstretched rubber.

The effect is not simply a component of the volume changes which occur on stretching or freezing, but is opposite in direction and has at least four times the magnitude which such volume changes would produce. Measurements have not yet been made of the change of volume accompanying the elongation. By analogy with the contraction of stretched rubber on heating, it seems probable that this phenomenon is related to the Gough-Joule effect, and that the increase in length is accompanied by a lateral contraction of such magnitude that the volume decreases.

Available evidence indicates that rubber hydrocarbon consists of very long molecules. When rubber is stretched, these molecules tend to be oriented parallel to the direction of elongation, so that, when freezing begins, a crystalline axis has already been established. The crystals are correspondingly oriented. During freezing a time comes when enough molecules have fallen into crystalline spacing to harden the sample and relieve the stresses that produced stretching. As more molecules move into the crystalline arrangement, the spacings at right angles to the stretch become less, the long directions of the molecules become more strictly parallel to the axis of stretch, and the sample is elongated. This explanation is supported by unpublished evidence regarding crystal growth at approximately —25° C.

## Expansion-Joint Fillers

DURING the past year the National Bureau of Standards has conducted an extensive study of expansion-joint fillers, with particular reference to their use in concrete roof slabs. Proprietary materials collected for the purpose were of 12 distinct types, which may be classified under the headings of plastic, premolded, and sheet-metal joints. Plastic compositions consisted of rubber latex compositions, bituminous materials for hot application, bituminous mastics for cold application, asphalt and rubber mixtures for hot application, and oil mastics.

Joint fillers obtained in form for insertion into the joints consisted of impregnated fiber boards, asphalt and fiber boards, sponge rubber, cork boards, rubber bound cork, and extruded rubber. Sheet metal joints were of two shapes of thin copper, one in the form of a bellows and the other shaped like an inverted "V".

These were subjected to various tests to determine the permeability or watertightness of joints, durability or resistance to weathering, behavior at various temperatures, and resistance to fatigue. Specimens of the joint fillers were exposed in the weatherometer in which they were subjected to the rays of a carbon arc lamp and moisture. Joint specimens between concrete blocks were exposed to the weather, high temperatures, low temperatures, and a cycle consisting of 18 hours at approixmately 12° F. 1 hour in water, and 5 hours at 122° F. Sheet-metal joints were tested only for fatigue, and for this purpose a special apparatus was made to simulate the opening and closing of the joints to determine the number of cycles before cracking.

All of the joint fillers containing rubber (except the type which is a combination of asphalt and rubber) showed rather marked hardening effects in the weatherometer exposure, according to the April, 1936, issue of the *Technical News Bulletin* of the National Bureau of Standards. Most of the rubber latex tests showed fairly satisfactory results. Sponge rubber and rubber bound cork, in most of the joint tests, resulted in leaky conditions with rather small joint openings. The extruded rubber type gave from fair to good indications in the joint tests. The mixture of asphalt and rubber was very difficult to hold in the joint at high temperatures.

## Selection and Training of Men

*(Continued from page 176)*

been carried on in our plant for a number of years. The classroom work in related subjects which supplements the actual shop experience of our apprentices is now carried on through an arrangement with our local university. Under this arrangement full use is made of the university facilities and instructors.

Additional supplementary training may be accomplished through the medium of employee publications, employee clubs and organizations, suggestion systems, and above all, through the earnest and everlasting efforts of higher management to consider the welfare of the employees in all of its everyday transactions.

### Summary

We have tried to indicate that in our opinion the job of training employees is a continuous job; it is always with us; we should no more expect our employees to become and to remain satisfactory workers through the mere application of a brief training period at the time of their employment than we should expect to qualify for managerial responsibility today and then disregard the need for constant self-development in the future to prepare ourselves for new responsibilities as they develop. The training of people — employees, supervision, as well as Management, must be a continuous process.

Selection should fit the employee to the job; training should help the employee adapt himself to the changing requirements of industry. The methods are not as important as the viewpoint.

# New Equipment

## High Pressure Air Eliminator

ESPECIALLY designed and constructed to meet the demand for an air eliminator that will automatically vent driers, steam coils, traps, etc., now being vented by hand, the Gorton High Pressure Air Eliminator has been introduced by the Gorton Heating Corporation, Cranford, N. J. This instrument can be used on all high pressure lines or equipment

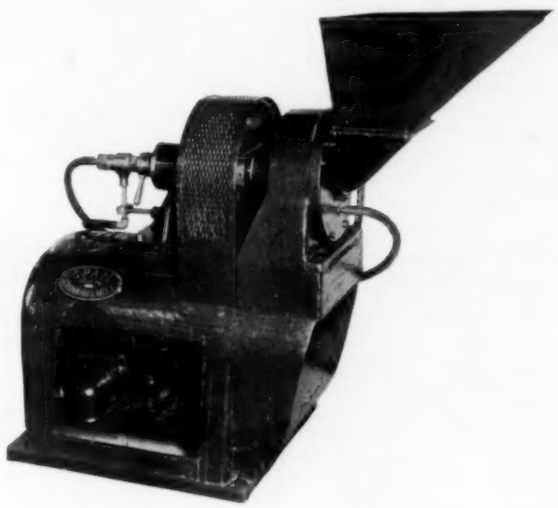
requiring automatic and quick air elimination under pressures up to 150 pounds. The operating member is said to be made of a special non-corrosive metal that is sensitive to heat changes, which makes it positive in operation. The operating member closes the valve at 212° F. and keeps it closed until the temperature drops below that point when it automatically opens the valve. This feature makes it impossible to stick the valve shut or to blow it shut when steam is turned on. The new air eliminator has a 2½-inch diameter, is 4⅝ inches high overall and has a ½-inch bottom pipe connection. The air outlet has a 3/16-inch diameter.

## Shock-Absorber Roller Conveyor

AFTER a six-month testing period, during which it was used in actual service, a shock-absorbing, resiliently mounted, roller conveyor has been introduced by the Mathews Conveyor Company, Ellwood City, Penna. Its manufacturer claims that heavy loads can be dropped on this new type conveyor without injury to the bearings of the rollers, due to the resilient mounting. Each roller of the conveyor carries its proportionate share of the load. This conveyor is said to incorporate the first major development of importance in the design and manufacture of ball-bearing roller conveyors since their inception, with the exception of improvements in bearing design from time to time.

## Improved Span Grinding Mill

A NEW model of the Span Grinding Mill (Type VIII), incorporating many advantages over the former model, has been introduced by M. Pancorbo, 155 John Street, New York City. The improved machine has a base wide enough to hold a 25 h.p.



motor, thus providing for greater production capacity. It also is equipped with a larger hopper than the former model so that larger quantities of the material to be ground may be loaded at one time. Other improvements include an 8 V-belt drive instead of a 6, and a guard over the pulley. The new grinder is capable of producing 200 to 400 pounds per hour, depending on the material used and the fineness of the powder desired. The Span Grinding Mill, which operates by means of disks with special grinding surfaces, is designed to reduce all kinds of vulcanized rubber waste to fine powder form and also handles hard rubber, chemicals and other materials.

## Bronze Hancock Valves

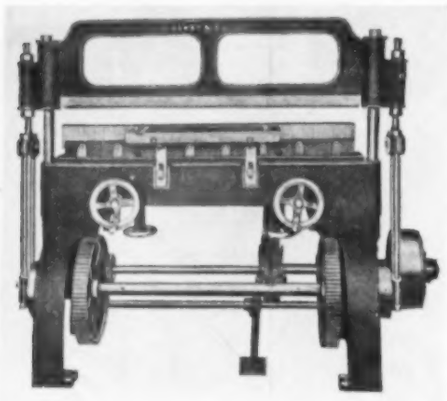
COMPLETION of 1¼, 1½ and 2-inch sizes in globe and angle patterns of the bronze valves featured by the Hancock Valve Division, Consolidated Ashcroft Hancock Company, Inc., Bridgeport, Conn., has been announced. This rounds out the line of special valves introduced to the market in sizes of 1 inch and smaller a year ago by the company. This valve line is distinguished by hard stainless steel seats and discs with which the valves are equipped, the trim in each valve being heat treated to a hardness of 500 Brinell and then machined on a diamond boring machine.

## Rockwood Dualsteel Union

DESIGNED to withstand severe pipe line abuses, such as occur in rubber factories and similar plants, the Dualsteel union has been perfected by the Rockwood Sprinkler Company, Worcester, Mass. The union is said to stand up under the strain of expansion and contraction in pipe lines and corrosive conditions caused by dilute sulfuric acid, particularly accelerated oxygen corrosion caused by the alternating of live steam and cold water in the same process lines. Dualsteel has a hardness of 180 Brinell, according to the company.

## Rubber Stripping Machine

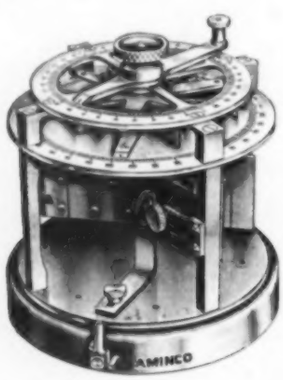
INCLUDED in the line of machinery for use in the rubber industry produced by the firm of Quarmby and Hilliker, Hutchinson Wharf, Lynn, Massachusetts,



is a standard 51-inch stripper for cutting rubber tile. This machine is said to be rapid in its operation and control is maintained at any position of the stroke by means of a foot treadle. The opening between the block and knife, when the knife is at its highest point, is 4 inches, thus giving ample room to pull the material through without scratching the surface. In addition to the 51-inch model, the company builds strippers with 62-inch, 94-inch and 115-inch knives, while strokes from ½-inch to 8 inches can be supplied. Besides rubber, this stripper is used for cutting leather, leather board, felt and other materials.

## Aminco Flexometer

AMONG the various rubber testing instruments manufactured by the American Instrument Company, Inc., Silver Spring, Maryland, is the Aminco Flexometer, especially designed to measure the flexu-




ral properties of sheet rubber, as well as paper, fabric, varnish films and other materials. This instrument was developed by the National Bureau of Standards. In the case of sheet rubber, it measures the flexural work—the amount of work done on the specimen in folding it through a definite angle (closely related to the stiffness of the specimen as appreciated by the fingers when the specimen is folded by them); flexural resilience—the amount of work recovered when the specimen is allowed to unfold; and flexural hysteresis—the amount of work lost when the specimen is folded and allowed to unfold, expressed as a percentage of the work done in folding the specimen. A set of six calibrated springs in the instrument, any one of which can be put into use at the operator's will, extends the range of the instrument to cover a wide range of materials. Known as Model 6-20, the Aminco Flexometer weighs 30 pounds.

## Federal Test Indicator

AN exceptionally compact test indicator, termed Model 2, has been developed by the Federal Products Corporation, Providence, Rhode Island. It is a universal type of indicator for checking the trueness of any machinery or mechanical parts and may be used in rubber factories for checking the alignment

of cylinder rolls, wear or play in rolls, bearings, shafts, etc. The new instrument is graduated to read .0001 inches and has a low-friction jeweled bearing. The movement consists of a combination lever and a direct contact crown gear so that friction and wear are reduced to a minimum. It is furnished with a universal holding bar and clamp in a case. Adapter rods are available for adapting the indicator to surface and height gauges or test sets. The company expects to bring out a similar instrument, graduated in .001 inches, to be called Model 1, shortly.

## Schrader Spark Plug Pump

A SPARK plug pump, so called because it screws into the plug opening in the motor, has been added to the line of products featured by A. Schrader's Son, Brooklyn, N. Y. It inflates all types of tires, air mattresses, rubber boats and air pressure tanks, and may also be used for spraying trees, paint, etc. Motorists can use it, particularly sportsmen and campers and trailer tourists for inflating boats and mattresses as well as tires. It makes excellent equipment for truckmen, bus operators and farmers when tires require air far from a service station—encouraging the immediate correction of under-inflation instead of risking damage to tires by riding on a soft one to the nearest service point. Any gasoline motor of two or more cylinders will operate it. Interchangeable adapters make one pump fit any standard plug opening. Construction of the pump unit is carefully engineered to assure quickest possible inflation and only passes clean, cool air. The opposite end of the pump hose is fitted with a tire valve connection. Tires can then be quickly inflated by running the motor at idling speed.

# Book Reviews

**The Reactions of Pure Hydrocarbons.** By Gustav Egloff. Published by the Reinhold Publishing Corporation, 330 West 42nd Street, New York City. 6 x 9 in. 900 pp. $16.75. (A.C.S. Monograph No. 73).

*(Available from Book Department, The Rubber Age).*

This monograph represents an attempt to correlate all the research work on the reactions of pure hydrocarbons being carried on by scientific organizations throughout the world. How successful this attempt was can best be realized from the 4500 references cited and the more than 50 pages of author and subject indexes. The book covers the reactions of pure hydrocarbons resulting from thermal, catalytic, photochemical and electrical treatment, and is the most exhaustive work on the subject to date. It correlates, explains and criticizes the mass of work done on the subject by approximately 1200 different investigators. The author, director of research for the Universal Oil Products Company, Chicago, is well qualified to offer such criticism. Rubber chemists will be particularly interested in the discussion of the non-catalytic treatment of rubber, which occupies a section of the last chapter of the book.

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**Man in a Chemical World.** By A. Cressy Morrison. Published by Charles Scribner's Sons, New York City. 292 pp. $3.00.

Properly described as "an autobiography of an industry", this book has as its object the awakening of the layman to the fact that the chemical industries render a service that touches practically every activity in which he engages, an object which it achieves by giving a straight-from-the-shoulder account of how chemistry transforms scientific progress into everyday necessities. The growing use of rubber in the automotive, electrical and other industries is briefly touched upon, while the importance of synthetic rubber in both peace and war time is stressed. The book has a subject index which enables the reader to quickly locate any particular chemical achievement. "Man in a Chemical World" was planned by the New York Section of the American Chemical Society as part of its program in connection with the 300th Anniversary of the founding of the chemical industries in the United States, which was celebrated in 1935. Although written primarily for the layman, rubber chemists, chemical engineers, industrialists and executives will find this book of interest.

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**Manual de la Industria de la Goma.** (Manual of the Rubber Industry). Edited by Luis Pascual Mejias Lopez. Published by La Goma, Calle de Moncada, 4, Barcelona, Spain. 7 x 10 in. 362 pp. 25 Pesetas, 15 Centimos to foreign countries, postage-paid (approximately $3.15).

Consisting of 50 chapters and a subject index, this book represents a summary of the various branches of the rubber industry. Chapters are devoted to the different species of rubber plants, cultivation, theory and methods of vulcanization, vulcanization accelerators, dissolution of rubber, analyzing crude rubber, testing methods, reclaimed rubber, solvent recovery, factice, manufacturing processes, pneumatic and solid tires, development of rubber machinery, manufacture and application of hard rubber, synthetic rubber, etc. The book is illustrated throughout, with pictures of rubber machinery liberally sprinkled through those sections devoted to manufacturing processes. It includes a number of suggested formulas for the production of various products. This manual is described by the publishers as being the first original book written in Spanish on the subject of rubber.

**Directory of New England Manufacturers—1937-38.** Published by George D. Hall, Inc., 665 Boylston Street, Boston, Mass. 8 x 10¾ in. 726 pp. $15.00.

This directory, new and completely revised, contains data on 17,000 New England concerns engaged in all types of manufacturing. The data includes names of the principal officers of each company, a description of the products made, number of factory employees, capital, and location of branch plants or offices. In addition to an alphabetical list, the same concerns are classified by state, city and town, while the directory also contains an alphabetical list of brand names, together with the names and addresses of the manufacturers. There is also a section devoted to an alphabetical breakdown by products. This book is invaluable to concerns selling to manufacturers located in the New England area. The next revised edition is scheduled for January, 1939.

# Booklets, Catalogs, etc.

**Properties of Du Pont Rubber Chemicals.** (Report No. 200). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9½ in. 164 pp.

In December, 1934, Du Pont issued a report (No. 187) which gave brief descriptions of the properties of the company's various accelerators, anti-oxidants and miscellaneous rubber chemicals. Because of the convenience it afforded rubber chemists the supply of the edition has been exhausted. This latest report (No. 200) is re-published edition of the earlier one, in revised and amplified form. Specific data on each product is given, including chemical composition, physical properties, compounding characteristics, and uses. In some cases tables giving a summary of physical test data are also included. Information on Du Pont's line of latex chemicals, as well as on neoprene (formerly called DuPrene), rounds out the report. Space is provided for notes throughout the book, which is the most complete one yet published by Du Pont on its line of rubber chemicals.

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**Collordata.** Collord, Inc., 7049 Lyndon Avenue, Detroit, Mich. 5¼ x 8 in. 24 pp.

Applications of the company's rubber lining materials is described and pictorially presented in this booklet, as well as its Surfaseal, a rubber protective coating paint. The booklet also contains reproductions of page advertisements recently used by the company in the metal and finishing fields, in addition to several short articles on the value of protective coatings by various engineers and chemists.

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**Micronex.** Binney & Smith Co., 41 East 42nd Street, New York City. 9 x 12 in.

This booklet contains a series of six insert advertisements previously used by the company in rubber journals. Each insert, colorfully printed, is devoted to specific data on the structure of a Micronex tread, the complete series giving an entire story. The data given is both practical and theoretical, and covers such angles as piling, orientation as a result of polarity, interstitial volume, etc.

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**Falk Steelflex Couplings.** (Bulletin 4100). The Falk Corporation, Milwaukee, Wisconsin. 8½ x 11 in. 36 pp.

This catalog (which supersedes Bulletins 181 and 182) describes and iliustrates the company's new line of an improved design of flexible couplings merchandised under the "Steelflex" trade name. Specifications, design, rating, method of selection and dimensions are given. Ratings of the new couplings range from .4 to 18,000 h.p.

# Editorial Comment

## Germany's Duty on Crude Rubber

LAST month, in an unexpected move, the German government announced a 100% duty on all imported crude rubber, gutta-percha and balata for the purpose of providing an income to partially defray the cost of financing synthetic rubber in that country. Scrap rubber and rubber substitutes, however, remain free of duty. The result of this duty will, of course, have two effects, *i.e.*, it will reduce the amount of crude rubber imported into the country and will raise the price of rubber products to the German consumer.

In view of the fact that Germany has been a heavy importer of crude rubber recently, taking 72,000 long tons last year, and approximately 22,000 long tons in the first three months of 1937, there is a fair possibility that its action may affect the statisical crude rubber picture. If German imports drop, as they are bound to eventually, then the supply of crude rubber for other countries will be increased, serving to ease up the tight position now prevalent.

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## The Causes of Fluctuations

IT is always interesting to dissect the causes behind the fluctuation of commodity prices, particularly rubber. Generally, it is a fairly easy matter to discern what domestic or foreign event lies behind a big price drop or a decided gain. Devaluation of currency (actual or rumored), strikes, shut-downs, decreased shipments of supplies, lowering of available stocks—all these are recognizable factors. Raids by speculators on the Exchange are always deplored, and recognized as a detrimental factor. There are many others.

The price of crude rubber during the past month has been subject to sharp and frequent fluctuations. Many of the usual factors responsible for this condition were absent, with the exception of renewed fears of the devaluation of gold in the United States. It is particularly interesting, therefore, to dig deeper into the causes for the severe fluctuation. One unusual adverse factor in the past month can readily be ascertained, *i.e.*, the action of the German government in imposing a duty of 100% on all crude rubber imports for the announced intention of financing the production of synthetic rubber in that country.

But what of the other causes? A careful study of market prices in the past 30 days reveals that a large drop in price occurred following a speech made by Sir Shenton Thomas, Governor of the Straits Settlements. In that speech Sir Thomas made two pertinent remarks: (1) that a reasonable price level to crude rubber producers lays between 8 and 10d (approximately 18 to 20 cents); and (2) restriction of output must be considered a temporary device. American rubber manufacturers will heartily applaud these statements.

For some time an unofficial debate has existed between producers and rubber manufacturers as to an equitable price for the commodity. The United States government has even taken a hand to the extent of mildly protesting conditions which permit prices to reach unreasonable proportions. On the one hand the manufacturers claim that producers can earn "respectable" profits from 18-cent rubber, while the producers claim a 25-cent figure would be nearer the mark.

It would appear that a commodity as important as rubber should not be subject to severe fluctuation, and responsibility for obviating this condition must again be laid at the door of the International Rubber Regulating Committee. That Committee has done well with "regulation" of supply; now it simmers down to a question of "regulating" price.

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## A New N.R.A. Takes Shape

AN old maxim states that "there are more ways than one of skinning a cat" and that phrase aptly applies to the current Administration's methods of regulating American business. Too well will it be remembered that one of the first actions of the government in taking power was the introduction of the ill-fated N.R.A. It might be news, however, to a number of manufacturers to learn that the N.R.A., or a large part of it, is again in our midst, *sans* flags, parades and eagles.

For instance, under the N.R.A. voluntary codes for individual trades or industries were provided where requested by majority groups or associations while the Federal Trade Commission is now empowered to create voluntary trade practice agreements (such as recently instituted in the tire trade) when requested by an industrial majority. Under the N.R.A. codes were not permitted to tend to monopoly, with the same condition currently applied under the F.T.C. Under the N.R.A. provisions for consumer protection and representation were included; now wider consumer protection is proposed through the extension of the Federal Trade Commission's control of advertising and a revised Pure Food and Drug Act.

We are not attempting here to quarrel with the determination of the government to regulate industry through passage of a series of bills covering angles ranging from merchandising practice to labor relationship, but simply point out the amazing similarity between current legislation and the defunct National Recovery Administration which, like Hamlet's ghost, has apparently returned.

CURRENT • NEWS of the Rubber Industry

JUNE, 1937

# Gains Continued in All Divisions of Industry According to Periodic Dun-Bradstreet Survey

## *Special Gains Are Recorded in Mechanical Goods Division With Tires and Tubes Holding Up Well In the First Three Months of the Year Despite Automotive Labor Disturbances*

DEMAND continued unabated for tires, mechanical goods, sundries, and other rubber products during the first quarter of 1937, according to the periodic survey conducted by Dun and Bradstreet, Inc., the latest of which has just been made public. Floods in the mid-West area gave a spurt to footwear sales, as well. All of these gains were extended from the upward movement in 1936 which carried crude rubber consumption to a new high for the second successive year and reduced world stocks sharply. Production of automobile tires was increased by 17.7% last year over the 1935 production, exceeding all previous annual totals since the 1929 high.

Manufacture of mechanical goods has assumed growing importance to the industry. Of the $750,012,000 given as the total value of production of all lines in 1936, automobile tires represented but $441,000,000, whereas in 1935 tires took up $390,300,000 of the $637,000,000 total, and $334,700,000 of the 1934 total of $548,000,000. Mechanical goods accounted for 9.9% of all the crude rubber consumed in 1936, as compared with only 5.2% in 1929, while the amount used by the tire industry dropped to 77.14% in 1936 from 84.34% of the 1929 total.

### *Decentralization is Speeded*

Labor conflicts again have started to confuse the outlook, after some relief from these outbreaks during most of 1936. As a result, many manufacturers have speeded their programs of decentralization, and plants already have been opened at points distant from the besieged centers. Costs of production have increased so rapidly that retail prices have yet to reflect these fully, in spite of the several advances made.

In nearly all divisions, manufacturers of rubber products were on higher schedules this year than during the first quarter of 1936, operations for the entire industry being around 90% of theoretical capacity. Production ranged from 15 to 25% larger, with the smallest increase in the boot and shoe division, where carry-overs were heavy.

Output of tires was not curtailed as much as expected during the first quarter by the sit-down strikes at automobile plants. Many companies took advantage of the interruption to catch up with orders, which were running ahead of deliveries. With the heavy replacement season approaching and inventories smaller than at the end of 1936, operations must be advanced steadily, if the estimated 32,000,000 replacement units are to be turned out in 1937.

Replacements accounted for 29,800,000 units of the 58,116,000 automobile tires produced in 1936. This total was 17.7% ahead of 1935 at 49,362,000, 23.0% more than in 1934, and 45.0% in excess of 1932, at 40,085,000 units.

Definite settlement of labor disturbances in the automobile industry doubtless will hold rubber consumption to a record high during the first half of the current year. With January use at 48,744 long tons and February at 50,282, first-quarter consumption was estimated at 150,000 tons, or 17.2% more than the 127,955 tons in the corresponding 1936 period, when a strike in one of the major tire plants reduced the February and early March totals.

Gain for the first quarter was extended from the all-time consumption peak established for 1936 at 573,522 long tons, according to the statistics compiled by the Rubber Manufacturers' Association, Inc. This was an increase of 16.7% over the 491,544 tons in 1935, the previous high, and 72.7% more than in 1932 at 332,000 tons. It was 22.5% larger than the 1929 total of 469,804 long tons, the unchallenged record until 1935.

World stocks of crude rubber declined steadily in 1936, as consumption rose. By the end of December, 1936, these had been reduced to 454,000 long tons, as computed by the *Survey of Current Business*, marking an uninterrupted decrease for the sixteenth consecutive month. This brought the monthly average for 1936 down to 521,498, or lower by 21.7% than the 1935 average of 666,397.

### *Prices Occupy Major Attention*

Prices have occupied major attention since last Summer, due to the higher wages and the rising cost of crude rubber, cotton, and other materials. Following an advance of 7 to 10% on January 1, mechanical goods were marked up another 10% on April 1. Further increases are indicated for the third quarter, to bring retail prices up to a better alignment with production costs.

Four mark-ups have been made in the retail price of tires and tubes since May 4, 1936, the latest of which was effective on March 13, 1937. The price now is 64.6% of the 1926 average, as against 64.4% in 1929.

### Rubber Is Leading Import

Largely due to sharp advances in price rather than its increased consumption in this country, crude rubber became the United States' leading import in 1936. The average import price rose from 11 to 15 cents a pound, most of it in the second half of the year. Crude rubber imports in 1936 totaled 1,093,446,000 pounds, according to the Foreign Commerce Department of the United States Chamber of Commerce, which was only 4.6% above 1935 and 7.8% above the 5-year average, advancing prices acting as a deterrent. Prior to 1936 crude rubber was third in the list of leading imports, preceded by coffee and cane sugar.

## OFFERS PROGRAM FOR INDUSTRIAL PEACE

Addressing the annual meeting of the Chamber of Commerce of the United States in Washington, D. C., recently, P. W. Litchfield, president of the Goodyear Tire and Rubber Company, Akron, outlined a five-point program for better relations between labor and industry. His program included: (1) a return to the orderly processes of government and re-establishment of law and order, while recognizing labor's right to bargain collectively; (2) responsibility of both labor and industry; (3) better understanding; (4) mediation; (5) establishment of an impartial fact-finding agency which would be available when industrial disputes threaten.

Discussing his first point—re-establishment of law and order—Mr. Litchfield pointed out that "all the lessons of history teach that where property rights become impaired and ignored, human rights soon after are obliterated . . . . Labor, above every other group in the community, has the most to fear and the least to gain from the whims and caprices of those who hold themselves above the law." Defending labor's right to strike, he also stressed the angle that "the protection of public interest is paramount and must be protected by law."

### *Discusses Responsibilities*

On the subject of responsibility, Mr. Litchfield stated that now that the right to collective bargaining is incorporated in our statutes (the Wagner Labor Relations Act) it must take place between responsible parties and be limited in such wise that the public interest is protected "and that the inherent and constitutional rights of minorities are also protected." He also called for clearer understanding and recognition of the status of both labor and capital and the reciprocal services which both contribute to business enterprise.

The need of a disposition on the part of industry and labor "to see the other fellow's point of view" and to welcome the services of competent, impartial mediators to help bring that about, was stressed by the speaker for his fourth point. In this connection he intimated that the traditional governmental attitude and machinery in mediating labor disputes requires revision since "in my judgment mediation calls for the highest type of unbiased and public-spirited service."

In addition, he urged the creation of impartial fact-finding agencies which, if sufficiently competent, could get at the real core of industrial disputes and present the facts to the public. He suggested "a cooling-off period" during which the public can make up its mind "and the disputing parties can perhaps gain a calmer view of their difficulties."

In concluding his address, Mr. Litchfield claimed that the simple principles outlined are thoroughly practicable. He stressed the point, however, that the desired end will not be achieved "unless those of us who are responsible for the livelihood of tens of thousands and even hundreds of thousands of employees are willing to cooperate among ourselves and with the government and its legislators, first, in devising a workable plan and, second, in doing our part to put it into effect."

## Coming Events

**June 18.** Outing of Akron Group, Rubber Division, A.C.S., at Silver Lake Country Club, Akron.

**June 28-30.** International Rubber Congress, Paris, France.

**June 28-July 2.** Annual Meeting, A. S.T.M. Hotel Waldorf-Astoria, New York City.

**Aug. 8.** Fishing excursion of Los Angeles Group, Rubber Division, A. C.S., leaving from San Diego Harbor.

**Aug. 13.** Outing of Boston Group, Rubber Division, A.C.S., at "Fieldston" in Marshfield, Mass.

**September 6-10.** Rubber Division, A.C.S. Rochester, N. Y.

**Oct. —.** National Association of Independent Tire Dealers, Chicago, Ill.

**October 11-15.** National Safety Council. (26th Safety Congress). Kansas City, Mo.

**Dec. 5-11.** Exposition of Chemical Industries Grand Central Palace, New York City.

## Cabot Expansion Program

Announcing to the trade that it is extending present price schedules through the balance of this year, Godfrey L. Cabot, Inc., Boston, Mass., producers of Spheron carbon black, made known its expanded facilities. Realizing early in 1935 that then existing facilities for the production of carbon black would not long continue to meet the increasing demand, Cabot launched an expansion program which is rapidly nearing completion. The company's new plant at Wickett, Texas, now in production, has a capacity of 1,200,000 pounds per month, while another plant at Kermit, Texas, which will soon be completed, will have a capacity of 1,100,000 pounds per month. New units added to the Armstrong plant in the northern Panhandle have increased its production by 450,000 pounds per month, while new facilities at the Bowers plant (said to be the world's largest carbon black plant) have increased production by 500,000 pounds per month. In all, Cabot has practically completed improvements to provide a net increase in production of 3,250,000 pounds per month.

## REPLACEMENT TIRES GAIN 53% OVER 1936

Stimulated by heavy replacement tire buying in anticipation of higher prices, tire shipments in the first quarter of the current year were the largest in any corresponding period since 1929, according to a survey completed by the Standard Statistics Company, Inc., New York City. Moreover, profit margins have been maintained despite increased costs of raw materials, especially rubber and cotton.

Shipments of replacement tires in this period were far above the normal volume, based primarily on dealer stocking prior to price increases. In comparison with the restricted volume of the first quarter of 1936, renewal tire shipments gained 48%, 59% and 53%, respectively, in January, February and March of this year, the three months total amounting to 8,100,000 units, or a gain of 53% over shipments in the first three months of last year.

After a decline in January (when General Motors experienced severe labor difficulties) original equipment tire shipments have gained appreciably, according to the survey, such shipments amounting to 6,400,000 units in the first three months of 1937, approximately 17% above the figure for the first quarter of 1936. Including the relatively small amount of exports, total tire shipments in the January-March period of the current year amounted to approximately 14,750,000 units, or 35% more than in the corresponding 1936 period.

The survey indicated that replacement tire shipments will probably fall off in the next few months in view of the fact that dealers are now well supplied, but since the automobile manufacturers are rushing production to make up time lost by strikes and shut-downs the total tire shipments should still exceed comparable 1936 periods.

## FACTORY OPERATIONS MAINTAINING PACE

Despite the curtailment of auto assemblies, which reduced the demand for original equipment tires considerably, operations at tire factories during January and February continued at a high rate, according to a survey conducted by the Federal Reserve Bank of Cleveland. Maintaining this pace is largely due to replacement tire sales, according to the survey, which are running approximately 20% in excess of the estimated normal for this time of year.

As a result of this condition, inventories of companies doing a replacement business only are reported to be small, but the industry as a whole is carrying more than 11,000,000 tires which is about 3,000,000 greater than ordinary requirements. Activity in replacement tire sales is attributed to some dealer buying for inventory purposes before costs go higher (there have already been two increases this year) plus the usual stocking up in preparation for the Spring season.

## R. I. RUBBER CLUB ELECTS NEW OFFICERS

Election of new officers, plus a golf tournament and a debate, featured the Summer meeting of the Rhode Island Rubber Club, held at the Pawtucket Golf Club on June 4. Although Sam Tinlsey, erstwhile executive of the Coated Textiles Corporation, was elected president, he immediately tendered his resignation, announcing that he had accepted a position with the R. T. Vanderbilt Company of New York City. Mr. Tinlsey, whose election was in the form of an honor because of his activities and keen interest in the club, was succeeded by Ezra L. Hanna as president. The latter, formerly secretary-treasurer of the club, is with the Davol Rubber Company, Providence. Charles Berlow, of the American Wringer Company, Woonsocket, was named secretary-treasurer for the 1937-38 period.

Members of the new executive committee include the following: John Marshall (Collyer Insulated Wire), Gladding Price (Vanderbilt), Carl Short (U. S. Rubber), Dave Scott, Jr. (Scott), F. E. Rupert (Anaconda), Ray Newell (Respro), A. B. Lingley (Phillips-Baker), and F. D. Chittenden (U. S. Rubber). The Nominating Committee was composed of Harry E. Thompson (Anaconda) as chairman, Dave Scott, Jr. (Scott) and Don Cummings (Collyer Insulated Wire).

***Davidson vs. Comes***

The feature address was a debate between J. H. Davidson and Don Comes, both of the Farrel-Birmingham Company, Inc., on the subject, "Mills vs. Banburys." Mr. Davidson took the *pro* and Mr. Comes the *con*, both presenting a number of arguments in favor of the type of mixer they were defending. Following the debate, Mr. Murray, Commissioner of Fish and Game for the State of New Hampshire, presented an address on "New Hampshire Wild Life," showing motion pictures of the scenes he described. He outlined a survey made by the State to determine the number and types of fish that various streams were best suited to and described the advantages the state offered to sports lovers.

A number of prizes were awarded to winners of several events in the golf tournament as follows: Low Net Score—Roy Edson (Anaconda), T. Simpson (Deystore), G. E. Wilson (Wilson), H. Douglas (N. E. Paper Tube), F. Jacoby (Jacoby), and S. J. Lake (Respro); Gross Score, Members Only—H. E. Thompson (Anaconda), R. A. Watt (Watt Bros.), R. Newell, (Respro), R. Cowen (Appleton), W. C. Weller (Wishnick-Tumpeer), W. H. Morley (Anaconda), and E. G. Brown (U. S. Rubber); Gross Score, Non-Members—E. B. Curtis (Vanderbilt), F. M. Rupert (Anaconda), Len Yates (Industrial Paper), Mr. Salamon (Binney & Smith), H. Simmons (Industrial Paper), and H. C. Fisher.

Prizes distributed at the meeting were contributed by the following companies: Akron Standard Mold Co., L. Albert & Sons, American Zinc Sales Co., Anaconda Sales Co., Ansbacher-Siegel Corp., Binney & Smith Co., Godfrey L. Cabot, Inc., E. I. du Pont de Nemours & Co., Wm. D. Eggleston, General Atlas Carbon Co.,

**The "Challenge Cup" donated by Wishnick-Tumpeer, Inc., to season team winner in the Rhode Island Rubber Club Golf League. The cup must be won twice before any team may retain permanent possession.**

Halowax Corp., C. P. Hall & Co., J. M Huber, Inc., *India Rubber World*, Industrial Paper & Cordage Co., D. H. Litter Co., Monsanto Chemical Co., New England Paper Tube Co., Naugatuck Chemical, Moore & Munger, H. Muehlstein & Co., N. J. Zinc Co., Pequanoc Rubber Co., Philadelphia Rubber Works, Phillip Brothers, THE RUBBER AGE, Stamford Rubber Supply Co., A. Schulman, Inc., Wm. R. Thropp & Co., Titanium Pigment Co., United Carbon Co., L. G. Whittemore Co., C. K. Williams & Co., and G. E. Wilson Co.

### New York Group Outing

The New York Group, Rubber Division, A.C.S., was scheduled to hold its annual outing on June 12 at the Alp's Castle, Preakness (Paterson), N. J. A galaxy of sports programs was arranged, with trophies and prizes provided for most of the contests. Wm. Higgins (United Carbon) was chairman of the event, assisted by W. C. Lingvall (U. S. Rubber). A complete review of the affair will appear in the next issue.

### Akron Outing on June 18

Plans have been completed for the annual outing and picnic of the Akron Group, Rubber Division, A.C.S., which will be held on June 18 at the Silver Lake Country Club. A committee has been appointed on golf and prizes will be given for that and other sports contests. A dinner will be served in the evening to top off the day's events.

## BOSTON RUBBER GROUP TO HOLD FIRST OUTING

As a result of a unanimous vote taken at its last meeting, the Boston Group, Rubber Division, A.C.S., will hold its first outing on August 13 at "Fieldston" in Marshfield, Massachusetts. Recreational facilities include baseball, surf swimming, a swimming pool, and other sports. Golf enthusiasts will use the course of the Marshfield Country Club. The Boston Group has issued a challenge to the Rhode Island Rubber Club to both a golf match and a baseball game.

Billy Hills, noted rifleman associated with the Remington Arms Company, will give an exhibition of both trick and fancy rifle and gun shooting during the outing. "Fieldston" is located on the south shore of auto route 3A, between Boston and Plymouth, Mass. Dr. R. J. Noble, of Malden, Mass., is chairman of the Boston Group.

## TIRE EXPORTS SHOW AN INCREASE OF 13.6%

Exports of automobile tires from the United States in the first two months of the current year were reported at 167,188 units, valued at $1,965,788, by the Bureau of Foreign and Domestic Commerce, which compares with 147,193 units, valued at $1,614,897, in the same period of 1936—an increase of 13.6% in quantity and 21.7% in value.

The increase in total value of the 1937 tire exports in the two-month period was occasioned by higher unit value resulting from higher crude materials prices. The unit value of tire exports in the first two months of 1936 was $10.97 ($19.05 for truck and bus tires and $8.80 for other tires), and $11.76 ($19.70 for truck and bus and $10.06 for other types) in the January-February, 1937, period.

### Adopt Rubber Cord Test

The "Oxygen Bomb" test has been officially adopted by the Underwriters' Laboratories, Inc., New York City, to determine the aging quality of rubber used in all rubber-covered lamp cords tested by the organization in the future. This test was adopted, according to report, because it was found that some manufacturers were replacing good quality rubber insulation with poorer grades, the latter constituting a fire hazard.

### Moves Detroit Office

Larger quarters in the Stromfeltz-Lovely Building, Grand Boulevard and Woodward Avenue, Detroit, have been taken by the Federal Products Corporation, Providence, R. I. The new quarters furnish better facilities for both the office force and for stocking the large supply of indicator parts carried by the Detroit branch. A number of service men also operate out of this office.

# Financial News

## United Shoe Machinery

Year ended February 27: Net income of $11,316,128 after provision for taxes, equivalent to $4.74 a share of common stock after deduction of preferred dividends ($440,908). During the year dividends amounting to $11,897,793 were paid on the capital stock of the parent company other than stock in its treasury. At the end of March 16 the company had 23,191 stockholders, of whom 2,206 were holders of preferred only, 19,645 were holders of common only, and 1,340 were holders of both preferred and common stock.

## Columbian Carbon Co.

March quarter: Net income of $1,448,536, after all charges and taxes except Federal surtax on undistributed profits, equivalent to $2.69 a share on 537,411 shares outstanding. In the same period of 1936 the company reported earnings of $1,028,153, or $1.91 a share. The directors recently declared a special dividend of 50 cents a share and a regular dividend of $1.00 a share, which was payable on June 10 to stockholders of record on May 17. Columbian's net income in 1936 amount to $4,021,137.

## Dayton Rubber

November 1, 1936 to February 25: Consolidated net profit of $201,229. Profit for the fiscal year ended October 31, 1936, amounted to $510,465. Dayton recently filed a registration statement with the Securities and Exchange Commission for a proposed issue of 25,000 shares of no par common stock to be offered at the market (approximately $650,000), the proceeds on which are to be used for debt retirement, equipment and working capital. Ritter & Company and Jackson & Curtis will handle the offering.

## N. J. Zinc Co.

March quarter: Net income of $2,169,841, after Federal taxes, depreciation, depletion, contingencies and other deductions, equal to $1.10 a share on 1,963,264 shares of $25 par capital stock. This compares with a net of $1,074,179, or 55 cents a share, in the initial quarter of 1936. No mention of the Federal surtax on undistributed profits was made in the current report.

## Raybestos-Manhattan, Inc.

March quarter: Net income of $674,504, or $1.06 per share, after provision for all charges, expenses and taxes, and adding $50,000 to the reserve for contingencies for the Federal surtax on undistributed profits. In the 1936 period net income amounted to $365,720, or 57 cents a share, before provision for the surtax. Directors recently declared a quarterly dividend of 37½ cents a share payable on June 15 to stockholders of record on May 28.

## Martin Tire Corp.

Four months ended April 30: Net earnings of $23,316 before charges, depreciation and taxes, an increase of approximately 255% over the $6,558 reported in the corresponding period of 1936. Directors have declared an initial quarterly dividend of 2%, equal to 10 cents per share on the $5 par 8% cumulative convertible preferred stock, payable on June 15 to stockholders of record on June 1. Sales volume for the four months was $289,553, or approximately 76% higher than the $164,654 sales in the 1936 period.

## Converse Rubber Co.

Year ended March 31: Net income of $202,466, equal to $2.78 each on 60,000 common shares outstanding after preferred dividend requirements. This compares with a net of $157,543, or $2.13 each on 57,232 common shares outstanding at the close of the preceding fiscal year.

## United Carbon Co.

March quarter: Net profit of $722,368, equal to $1.81 each on 397,885 shares of no-par common stock, which compares with a net of $567,831, or $1.32 a share, in the 1936 period.

## Norwalk Tire and Rubber

Six months to March 31: Net income of $42,917 before provision for Federal income taxes, which compares with a net loss of $31,025 reported in the corresponding period last year.

## Lee Tire and Rubber

Six months ended April 30: Net profit of $473,277, or $1.83 a common share, which compares with a profit of $101,297, or 39 cents a share, in the corresponding 1936 period.

## Collyer Insulated Wire

For 1936: Net income of $178,752, equal to $1.19 a capital share, which compares with net profit of $107,055, or 77 cents a share, in the previous year.

## Lima Cord Sole and Heel

For 1936: Net income of $105,676 after providing $1,706 for surtax, which compares with net income of $42,656 reported in the previous year.

## General Plans New Rights

General Tire and Rubber Company, Akron, plans to issue rights to common shareholders to subscribe to approximately 60,000 shares of common stock. A special stockholders' meeting was scheduled to be held at the company's offices on June 8 to vote on an increase in the authorized common stock from 500,000 shares to 750,000 shares. General now has 452,875 shares outstanding, with the remainder of the present authorized common set aside for sale to employees. It is believed that proceeds of the sale of the new stock, if approved, will be used in connection with the mechanical rubber goods factory at Wabash, Indiana, operated by General.

## Seiberling May Pay Debentures

The Seiberling Rubber Company, Akron, is believed to have a plan under consideration which would enable it to pay off its debenture issue of $2,350,000 which is due in October of the current year. Although Seiberling has been operating at near capacity for the past several months little earnings have been realized because of a close profit margin, according to authoritative sources. Due to the advance in tire prices, however, the company is expected to make a "fair profit" during the remainder of the year.

## Williams Upheld in Suit

Judge George H. Moore of the United States District Court, St. Louis, Mo., handed down a decision several weeks ago in favor of C. K. Williams and Company, Easton, Penna., in its suit against the National Pigments and Chemical Company. Following a controversy over the terms of a contract granted to Williams by National, the latter declared the licenses forfeited and attempted to cancel the contracts. Williams then brought suit under the Declaratory Judgments Act to have the contracts judicially interpreted. The contracts involved patents owned by National Pigments and Chemical Company covering the use of iron oxide and bentonite for the control of mud fluids in the drilling of oil and gas wells. Williams was upheld on all points, Judge Moore finding that the contracts were valid and that the attempt to cancel them was improper.

## U. S. Places Tire Orders

Contracts to supply the Government with various sized tires and tubes for the six-month period starting April 1st have been awarded by the Treasury to the following companies: Firestone, Fisk, General, Goodrich, Goodyear, Kelly-Springfield, Lee and Seiberling. The tires are delivered to military and naval posts throughout the country, as specified by the Government.

## COMPLETE PROGRAM FOR 40TH A.S.T.M. MEETING

The program for the 40th Annual Meeting of the American Society for Testing Materials, to be held at the Waldorf-Astoria in New York City on June 28-July 2, has been completed. In addition to divisional meetings and an exhibit of industrial testing equipment, special addresses will be made by Dr. T. Smith Taylor, Professor of Physics, Washington & Jefferson College, and by A. C. Fieldner, chief of the technologic branch of the U. S. Bureau of Mines.

Reports will be made by Committee D-9 on Electrical Insulating Materials and Committee D-11 on Rubber Products at the 11th session of the meeting, which will be held on Wednesday, June 30, at 1:30 P. M. Reports of other committees, including those on petroleum products and textiles, will also be presented at this session.

The Rubber Committee, of which O. M. Hayden is chairman, will present new tentative methods for air pressure heat test of vulcanized rubber and for determining the resistance of soft vulcanized rubber and rubber-like materials to liquids. It will also submit revisions in two tentative specifications for insulated wire and cable covering respectively the Class AO, 30% Hevea rubber compound and the performance rubber compound, as well as in the tentative methods of test for abrasion resistance of rubber compounds and for compression set of vulcanized rubber. In addition, the Committee will recommend withdrawal of tentative specifications for Class A, 30% Hevea rubber compound insulated wire and cable.

Summaries of the activities of various sub-committees, particularly those on insulated wire and cable, abrasion tests for rubber products and tests on liquid rubber products, will also be given during the 11th session.

## Making Giant Airplane Tires

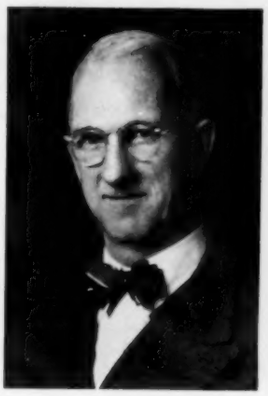
Giant airplane tires, each designed to carry 15 tons, are being produced by the B. F. Goodrich Company, Akron, for installation on the first of a fleet of 40 passenger super-transport planes now nearing completion in the factory of the Douglas Aircraft Company, Inc., Santa Monica, California. The tires are 5 feet, 5 inches in diameter, are 2 feet across at the base, and weigh approximately 360 pounds. They are the largest ever built for use on American airplanes.

## DuPont Monthly News Letter

The Rubber Chemicals Division of E. I. du Pont de Nemours and Company, Inc., Wilmington, Delaware, has inaugurated a monthly news letter, the first of which was dated May 6. A feature of the "letter" will be enclosures of laboratory reports classified by subjects for convenient filing in notebooks. The reports, which are perforated, are of the standard 6¼ x 9½ inch size.

## NEW OFFICERS OF THE AKRON RUBBER GROUP

G. L. ALLISON



A. E. WARNER

H. V. POWERS

All three of the recently-elected officers of the Akron Group, Rubber Division, A.C.S., boast long-term service in the rubber industry. These officers are: G. Lloyd Allison, chairman; A. E. Warner, vice-chairman; and H. V. Powers, secretary-treasurer.

Mr. Allison, who served as vice-chairman last year, is a native of Pennsylvania, having been born in New Castle. He was graduated from the Pennsylvania State College in 1912 with a B.S. degree in chemistry. After serving as a chemist with the Emery Manufacturing Company and in the Pittsburgh Testing Laboratory he joined the B. F. Goodrich Company in 1917 and has been with that company ever since. At various times he has served in the general analytical laboratory, in charge of testing and inspection of incoming pigments, in the raw material department and in mechanical goods compounding.

Since 1929 Mr. Allison has been acting as manager of the technical service department of the processing division, in charge of technical control, development and specifications on mixing, calendering, etc. Mr. Allison is married, has two children, and lives in Akron. His hobbies include golf and gardening, the former being carried on "for my amusement rather than for the benefit of the golf score card," as he puts it. His fraternal affiliations are limited to the Masons, being a member of the Consistory as well as the Blue Lodge.

Arthur E. Warner was born at Mt. Holly, Vermont, went to high school at Black River Academy, Ludlow, Vermont (from which Calvin Coolidge was graduated) and attended Buchtel, now Akron University. His first job was as assistant chemist for Goodrich, where he later took charge of the laboratory. For two years he served as chief chemist at the Pennsylvania Rubber Company and returned to Akron in 1909 to install a laboratory for the Miller Rubber Company. After a 10-year stay with Miller he joined Firestone in 1919 and in 1920 became chief chemist for that company, later serving as consulting chemist. He became associated with the C. P. Hall Company in 1930 and has been with that organization since. He is married, has two children and two grandchildren. His hobbies include fishing, swimming and golf.

H. V. Powers was born on a farm near Mount Pleasant, West Virginia, grew up in Indiana and joined Goodyear in 1916 as a tire finisher. Shortly thereafter he joined the Flying Squadron and was soon transferred to the Canadian factory, then located at Bowmanville. In Canada he was given the task of organizing a branch of the Flying Squadron. When the Toronto factory was opened Mr. Powers was sent there in charge of the labor department and the Squadron. He returned to the Akron factory in 1923 to take charge of the physical testing laboratory, later transferring to research activities. For the past seven years he has had charge of the section of compounding which has to do with quality control of raw materials.

## Organize New Institute

Organized as a non-profit venture, the American Documentation Institute has been incorporated in Wilmington, Delaware, on behalf of leading national scholarly, scientific and informational societies to develop and operate facilities which are expected to promote research and knowledge in various fields, including rubber. A first objective of the new Institute is to develop and apply the new technique of microphotography to different materials.

## Seek Receivership

Seeking a judgment for $27,000, claimed on a series of 18 promissory notes, R. B. Taggart and others recently filed suit against the National Tire and Rubber Corporation, of East Palestine, Ohio. The petition also requested that the court name a receiver to take charge of the company's affairs and to order the entire plant, consisting of real property and equipment, be sold to satisfy the requested judgment. No decision was made by this writing.

# Los Angeles News

The annual deep sea fishing trip for members and guests of the Los Angeles Group, Rubber Division, A.C.S., has been set for Sunday, August 8. A modern Diesel-driven, 65-foot fishing boat has been leased and it is planned to leave San Diego harbor at 4 A. M. for the Coronado Island area off the coast of Old Mexico. The party will return to San Diego at 2 P. M. The boat has accommodations for 40, a number that will be easily managed, according to Ed Royal, in charge of the trip.

Moving pictures in color will be taken of the excursion and will be shown at the first indoor meeting of the group next Fall. Prizes, amounting to more than $100 in value, will be distributed for certain catches. Tuna and yellowtails will be the principal fish sought. A $5.00 fee is being charged each fisherman and a special prize of a complete fishing outfit is being used in a general sale of tickets, even to outsiders, as a further means of raising funds. As usual, the fishermen will be accompanied to San Diego by their families and friends, with special events planned ashore.

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Charles N. Merralls, president, Rubbercraft Corporation of California, Ltd., and president of the California Rubber Manufacturers' Association, is leaving with his family for Detroit on June 18 to attend the annual Shriners' convention. Mr. Merralls is scheduled to continue on to New York and Boston after the convention and is due back in Los Angeles late in July.

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T. Kirk Hill, president, Kirkhill Rubber Company, has been confined to his bed for some time with a severe case of intestinal influenza. If sufficiently recovered, he is expected to attend the annual Shriner's convention in Detroit, later this month.

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A group of fishing enthusiasts from the rubber industry enjoyed a three-day fishing trip out of Ensenada, Mexico, on May 16-19. The group included Ed Royal (H. M. Royal), Fred Carpenter (U. S. Rubber), and Fred Oberschmidt (Cutler-Hammond). A good catch of tuna and yellowtails was reported.

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"Are rubber manufacturers sensing the importance to them of the longer play day?" is a question raised by A. S. Rocklen of The Golden State Rubber Mills, Inc., Los Angeles. "We have heard much of the good likely to come from the shorter work day," says Mr. Rocklen, "but we are feeling the possibility of a great mass of new business emanating from the longer play day.

"The demand for games and more games is already with us. We are having calls from many inventors and would-be inventors who are studying out or trying to study out new games, quite largely outdoor games. They have ideas for game equipment that would have to be made of rubber to be of much use. For example a game resembling quoits but seemingly offering more variety and complexity of play has been brought to our attention. If this game were to go over and prove popular throughout the country it would mean considerable to the rubber industry.

"Our company is right now going into golf ball manufacture on a fairly large scale for we feel that golf in spite of its great vogue is even yet merely in its infancy. We think that in a few years there will not be golf courses enough in Los Angeles or any other city to accommodate more than a fraction of the people who want to play. The golf ball industry is just beginning.

"Only recently a revival of interest in pee-wee or miniature golf has become apparent to all who have their eyes open. One Los Angeles concern owning six such courses built during the miniature golf boom has re-opened the whole six and they now are attracting plenty of patronage.

"We are having calls for rubber mats with artificial grass or greens upon them to be used for tee-off mats in miniature courses. We have had inquiries for rubber base-ball bats and a variety of play ground equipment. We look for more such inquiries every week in the year.

"Yes, with the work day getting shorter and shorter the outdoor play day is getting longer and longer. The rubber industry has a chance not only to benefit itself by getting busy on play and sports equipment but it also has a chance to do society a real benefit through the promotion of healthful, wholesome play, the type of play that never hurt anyone."

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### Returns to France

Jean Le Bras, who came to this country recently in the interests of the French Rubber Research Institute and who attended the meeting of the Rubber Division, A.C.S., held at Chapel Hill, North Carolina, in April, returned to France on the *S. S. Normandie* on June 2. Prior to his departure a farewell dinner was held at the Swedish Rathskeller, 52nd Street and 3rd Avenue, in New York City, where diners included Dr. I. Drogin, W. B. Wiegand, Peter P. Pinto, A. R. Kemp, George Grove, H. V. Whelan, Bruce R. Silver and R. H. Gerke, in addition to M. Le Bras. M. Le Bras visited laboratories in various sections of the country during his stay.

## DIRECT RETAIL SALES SHOW LARGE DECLINE

Direct sales to retailers by manufacturers of all types of rubber products have declined appreciably in recent years, according to an announcement from the U. S. Census Bureau. The trend is to sales through company-owned branches and direct sales to large industrial users.

The Bureau's report shows that direct sales to retailers dropped from 15.6% of all sales in 1929 to 8.9% in 1935, while sales made through the manufacturers' wholesale branches and retail stores increased from 42.2% of all sales in 1929 to 45.7% in 1935. Sales to industrial concerns jumped from 25.9% to 29.3% in the six year period.

According to the Bureau's statistics, there were 464 companies engaged in the manufacture of rubber products in 1935, total net sales of all these concerns amounting to $695,634,000, of which $654,910,000 represented sales through channels of primary distribution.

# NEW ENGLAND

Industrial payrolls in Naugatuck, Conn., for the month of April totalled slightly more than one million dollars, setting a new record for the community. A large proportion of the increase was due to activity in the Naugatuck plants of the U. S. Rubber Products, Inc., and its affiliates, which are by far the largest employers in the town. The May total, with only four paydays in the month, instead of five as in April, was expected to pass the $900,000 mark.

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Senate Bill 60, prohibiting employment of boys under 18 in specified hazardous occupations, and of girls under 18 in any job where they are required to stand continuously, has been passed by both houses of the Connecticut General Assembly at Hartford and signed by Governor Wilbur L. Cross, becoming Public Act 14 of the 1937 session. The definitions of "hazardous occupations" include operation of emery, stone or buffing wheels.

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The Bridgeport Web Company, Bridgeport, Conn., which has operated for a number of years in a small plant on Bishop Avenue, has bought the former Challenge Cutlery Company plant at Kossuth and Seymour Streets, consisting of two brick factory buildings containing 50,000 square feet of floor area. The web company, of which B. R. Bresler is president, will occupy the entire second floor, continuing to lease the ground floor to present industrial tenants.

# Names in the News

W. B. WIEGAND, director of research, Columbian Carbon Company, New York City, is scheduled to sail on June 16 to attend the International Rubber Congress in Paris, where he will contribute a paper on an entirely new approach to the testing of carbon pigments. He will also visit other European countries and is due back in the United States about July 26.

JAMES J. NEWMAN, a vice-president of the B. F. Goodrich Company, Akron, for the past four years, has been named vice-president and general manager of the company's tire division. He joined Goodrich in 1931 as assistant to the president.

H. B. SOULEN has resigned his position as vice-president and factory manager of the Kelly-Springfield Tire Company, Cumberland, Maryland, and is believed to have accepted an executive post with a "mid-western tire company."

JAMES C. WARDEN, until recently in charge of the development department of Goodyear at Los Angeles has been appointed superintendent of the Kelly-Springfield factory.

RAY WETZEL, advertising manager, Dayton Rubber Manufacturing Company, Dayton, Ohio, addressed the Indianapolis Advertising Club in Indianapolis last month on the general subject of advertising campaigns.

HENRY I. BOUCHARD has joined the Detroit office of the Federal Products Corporation, Providence, R. I. R. T. PALMER, Federal's New England agent, has also opened an office in Rochester, N. Y., at 241 Powers Building, with ROBERT B. HAWKINS in charge.

W. J. LEE, development department, Goodyear Tire and Rubber Company, Akron, credited with the development of the "Lifeguard" tube, sailed from New York for Java last month where he will become superintendent of Division "B".

FRED HURT has been named Chicago representative of the Roxalin Flexible Lacquer Company, Elizabeth, N. J. He will maintain headquarters at 5855 North Mobile Avenue, Chicago.

JACK BLANDIN, manager, crude rubber purchasing, Goodyear Tire and Rubber Company, Akron, recently completed 25 years of service with the company. One of his gifts was a greeting printed on silk from 10 Chinese employees at the crude rubber warehouse in Sumatra.

THOMAS ROBBINS, JR., president, Hewitt Rubber Corporation, Buffalo, N. Y., has been elected a director of the Niagara Share Corporation, of Maryland.

## Litchfield Predicts Gain

Returning from a European trip on the *S.S. Europa* on June 1, Paul W. Litchfield, president, Goodyear Tire and Rubber Company, Akron, predicted that crude rubber consumption will reach or exceed 1,100,000 long tons this year, or approximately 10% above the 1936 figure. He stated that rubber plantations are preparing to increase their production and exports to take full advantage of the 90% quota allowed them under the restriction scheme beginning July 1, and that the availability of these additional supplies will relieve the tight situation of recent months with regard to a possible rubber shortage. He expressed full confidence in the International Rubber Regulation Committee with regard to its future actions and their effect on the American rubber industry. Mr. Litchfield also recently predicted that sales of tractor and farm implement tires will reach 800,000 units in 1937 with a value of approximately $16,000,000.

DR. EARL G. STURDEVANT has been appointed consulting engineer of the Electrical Wire and Cable Department of U. S. Rubber Products, Inc. He joined the company in 1929, coming from Western Electric, and was appointed development manager of the wire and cable department in 1931. He will continue active participation with this division in his new consulting capacity.

S. B. ROBERTSON, newly-elected president of the B. F. Goodrich Company, addressed a meeting of the Cleveland Rotary Club in Cleveland on May 20. He discussed Goodrich's policy of decentralization.

E. G. HOLT, assistant chief, Leather and Rubber Division, Bureau of Foreign and Domestic Commerce, addressed a joint meeting of the Akron Chamber of Commerce and the Akron Export Club on May 18 in Akron. He discussed international trade in rubber and other commodities.

DAVID M. GOODRICH, chairman of the board, B. F. Goodrich Company, Akron, was elected a member of the executive committee of the National Industrial Conference Board at the 21st annual meeting of the Board held in New York City last month.

C. S. CHING, director of industrial and public relations, U. S. Rubber Company, addressed the annual meeting of the Trade Association Executives held in New York City on May 25, on the subject of the part associations can play in bettering employer-employee relationships.

## A. C. BOWERS HEADS PENNSYLVANIA CO.

Archibald C. Bowers, vice-president and general manager of the Pennsylvania Rubber Company, Inc., Jeannette, Penna., has been elected president of that company. Mr. Bowers,

A. C. Bowers

who joined Pennsylvania Rubber in 1928 as vice-president in charge of manufacturing, has been identified with the rubber tire industry for the past nineteen years and has served with both the Inland Rubber Company, Chicago, and the Mason Tire and Rubber Company, Bedford and Kent, Ohio.

Joining Pennsylvania in 1928, Mr. Bowers was named vice-president and general manager in April, 1936. Since the resignation of the late William O. Rutherford in December, 1934, Pennsylvania has had no corporate president, the affairs of the company being ministered by an executive committee.

Pennsylvania Rubber recently held a two-day sales conference at the factory at which addresses were made by Mr. Bowers, W. A. Atkins, chairman of the board, A. Koehler, sales manager, Charles M. DuPuy, advertising manager, and others. A feature of the meeting was a banquet tendered the visitors by the company at the Greensburg (Pa.) Country Club.

G. C. WELLES, for the past ten years sales manager of the Brown Shoe Company, St. Louis, has been named assistant manager, sole and heel department, Goodyear Tire and Rubber Company, Akron.

C. M. YOUNG has been elected president of the L. A. Young Spring and Wire Corporation, Detroit, succeeding L. A. YOUNG who becomes chairman of the board. The L. A. Young Golf Ball Company is a subsidiary of the spring and wire concern.

## RUBBER MONOGRAPH NEARS PUBLICATION

"Chemistry and Technology of Rubber", A.C.S. Monograph 74, edited by C. C. Davis and J. T. Blake, will be published next month by the Reinhold Publishing Corporation. Comprehensive in its scope, consisting of 896 pages, profusely illustrated, this book is one of the most important works on rubber to make its appearance in a number of years. It will sell at $15.00 per copy.

Although there are several contributions from renowned European and Canadian technologists, the rubber monograph is essentially a treatise by American experts on current practices in the American rubber industry. A large number of noted chemists and engineers have contributed important chapters. Emphasis has been placed on the latest technical developments which have grown out of such research achievements as the x-ray study of the configuration of the rubber molecule, a more complete understanding of the behavior of rubber in liquids, and the growing realization of the basic changes in physical structure developed during reinforcement loading and vulcanization.

Because of its exhaustive treatment of the mechanism of aging, oxidation, and deterioration of rubber on exposure to light and heat, and its host of additional information, the monograph has an appeal to the research investigator and student as well as to the routine analyst, the development engineer, the factory compounder, and others. In addition to its pertinent interest to the rubber industry, "Chemistry and Technology of Rubber" will also prove invaluable to both the suppliers of materials to the industry and to the growing number of concerns outside the industry using rubber and latex in one form or another.

A complete list of chapters and authors, as well as further descriptive data, wil be found on page 147 of this issue. The monograph is available from the Book Department of THE RUBBER AGE.

## 100% DUTY ON RUBBER IS SET BY GERMANY

In a determined effort to finance the production of domestic synthetic rubber, Germany placed a 100% tax on the importation of crude rubber, effective May 13. Heretofore crude rubber was admitted duty-free. The tax naturally doubles the price of crude rubber to users in Germany.

In explanation of this startling and unexpected order, which immediately resulted in higher prices on all German rubber goods, the government stated that the production of buna—German term for its synthetic rubber—is one of the most important points in its second four-year plan, recently launched, and that private industry alone could not afford to construct the necessary factories. For that reason government funds must be employed and they will be secured from the tax on imported crude rubber.

I. G. Farbenindustrie, A.G., the German dye trust, recently formed a 20,000,000 mark corporation called the Buna Company, and it is understood that a good portion of the tax raised on crude rubber importations will go toward financing this project. Although statements from German scientists claim that buna can be produced for only 60% more per pound than crude rubber at its present market price, American and English rubber chemists dispute this statement with the claim that it costs approximately four times as much.

### California Rubber Tree

A rubber tree originally planted in 1872 in the garden of the historic Crabb family in Santa Barbara, California, which is now more than 64 years old, is reported to be in excellent shape. While there are several other rubber trees in the section, few compare with this specimen. Its smallest circumference measures 21 feet; its surface roots spread out in all directions; and it towers high above surrounding trees. When a visitor steps off the train in Santa Barbara, this tree is one of the first things to meet his eye.

### Name Arrangement Committee

Dr. H. L. Trumbull, chairman of the Rubber Division, A.C.S., has named Dr. A. A. Somerville (R. T. Vanderbilt), J. M. Bierer (Boston Woven Hose) and W. B. Wiegand (Binney & Smith) as members of the Committee on Arrangements for those American rubber chemists and engineers who may wish to make the trip to London, England, next year, to participate in the International Conference of the Institution of the Rubber Industry. Dr. Somerville will act as chairman of the committee. Dr. A. R. Kemp (Bell Telephone Laboratories) is acting as a committee of one to pass upon any papers submitted by American chemists for presentation at the Conference. Dr. Trumbull has also announced that Dr. R. H. Gerke (U. S. Rubber) has accepted the chairmanship of the Crude Rubber Committee succeeding Harold Gray, retired. The Committee held a meeting in Akron on June 4.

### Pharis Buys Office Building

The Pharis Tire and Rubber Company, Newark, Ohio, has purchased a factory building in Newark, near to its plant, and will move its general and executive offices into the building as soon as alterations are completed. The present office space will be used as additional operating room. Purchase price of the new building was not announced.

## APRIL CONSUMPTION SHOWS 4.2% DECREASE

Consumption of crude rubber by manufacturers in the United States for the month of April is estimated to be 51,797 long tons, which compares with 54,064 (revised) long tons for March. April consumption shows a decrease of 4.2% under March and is less than 1% under April a year ago according to statistics released by the Rubber Manufacturers Association. Consumption for April 1936, was 52,031 (revised) long tons.

Gross imports of crude rubber for April are reported to be 35,850 long tons, a decrease of 31.1% under the March figure of 52,039 long tons and 11.2% under the 40,370 long tons imported in April 1936.

Total domestic stocks of crude rubber on hand April 30 are estimated at 174,934 long tons, which compares with March 31 stocks of 191,928 (revised) long tons and 277,478 (revised) long tons on hand April 30, 1936.

Crude rubber afloat to United States ports as of April 30 is estimated to be 72,530 long tons, which compares with 56,994 long tons afloat on March 31 and 47,678 long tons afloat on April 30 a year ago.

April reclaimed rubber consumption is estimated at 14,806 long tons; production, 13,884 long tons; and stocks on hand on April 30, at 17,117 long tons.

## TIRE SHIPMENTS DROP BY 3.1% IN FEBRUARY

Shipments of pneumatic casings during the month of February are estimated at 4,370,630 units, a decrease of 3.1% under January but were 36.1% above shipments made in February, 1936, according to statistics released by the Rubber Manufacturers Association.

Production of pneumatic casings for February is estimated at 5,245,894 casings, an increase of 5.3% over January and 46.6% above February, 1936.

Pneumatic casings in the hands of manufacturers, February 28, 1937, are estimated at 12,307,681 units, an increase of 8.2% over the stocks on hand January 31 and 32.8% above stocks on hand February 29, 1936.

The actual figures are as follows:

PNEUMATIC CASINGS

| | | *Shipments* | *Production* | *Inventory* |
|---|---|---|---|---|
| Feb., | 1937 | 4,370,630 | 5,245,894 | 12,307,681 |
| Jan., | 1937 | 4,509,240 | 4,980,174 | 11,377,015 |
| Feb., | 1936 | 3,211,654 | 3,578,627 | 9,264,581 |
| Feb., | 1935 | 3,287,394 | 4,382,663 | 11,529,561 |

### Oaks Plant in Operation

The tire division installed by the B. F. Goodrich Company at its Oaks, Pennsylvania, factory, is now in operation and is producing original equipment tires for Ford, Chevrolet and Plymouth, according to word from Akron. The new division is capable of producing 5,000 tires per day.

## GOVERNMENT REPORTS ON 1936 CONSUMPTION

The Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce has concluded its annual survey of United States consumption of crude and reclaimed rubber and of year-end stocks of both these materials. The survey, covering the year of 1936, reveals that 575,000 long tons of crude rubber were consumed and 133,000 long tons of reclaimed rubber, while stocks on hand on December 31, 1936, were 223,000 long tons and 19,000 long tons, respectively. Reclaimed rubber production for 1936 was set at 142,000.

Crude rubber consumption was arrived at on the basis of reports made by 395 rubber manufacturers, plus closely authentic information concerning the consumption of 76 additional companies. The figure secured was augmented by 2,168 long tons, the estimated amount consumed by numerous other small users of rubber. The grand total—575,000 long tons—is higher than the 573,839 long tons estimated by the Rubber Manufacturers Association for the same year. The government estimate for 1936 represents an increase of 17.7% above the 491,544 long tons reported consumed in the previous year.

Reclaimed rubber consumption data was reported by 255 manufacturers for a total of 121,639 tons, while data on 31 additional companies secured from various sources added 9,095 tons to this total. The addition of 22,666 tons covering unknown consumption of other users swelled the grand total for the year to 133,000 tons reported as official. The ratio of reclaimed to crude consumed in 1936 was 23.1% as compared with 23.9% in the previous year. Year end stocks of reclaim to the amount of 13,638 tons was arrived at by reports from 255 rubber manufacturers; this figure, plus reports from all reclaimed rubber producers and an estimate of 1,015 tons of other stocks, made for the grand total of 19,000 tons.

## CANADIAN INDUSTRY SHOWS STEADY GAIN

The Canadian rubber industry has showed steady gains since 1932, according to a report recently issued by the Dominion Bureau of Statistics, Montreal. The gross value of products manufactured in 1935 totalled $55,949,000, according to the report, which compares with $55,230,000 in 1934, $41,511,000 in 1933, and $40,746,000 in 1932. Total number of rubber manufacturers in 1935 amounted to 45, 31 of them in the Ontario area. These 45 plants represented an investment of $63,435,000; total salaries and wages paid amounted to $11,017,000; and the cost of materials used was $20,258,000.

The largest contribution to the total value of the Canadian rubber products output in 1935 was made by tires and tubes, which represented approximately 50%. Although the volume of tires and tubes fell off from that of the preceding year, the value was slightly higher. The footwear division of the industry showed a small decrease in both volume and value as compared with 1934. All other rubber goods showed small gains.

Imports of rubber and rubber articles in Canada during 1935 declined moderately from 1934, the report shows, with exports increasing slightly. Early returns for 1936, however, show gains in both imports and exports. Exports of rubber articles from the Dominion increased from $6,672,000 in 1932 to $12,517,000 in 1935. Based on early returns, exports in 1936 will probably exceed $14,000,000 in value.

## 1937 RUBBER DIRECTORY NEARS COMPLETION

The 1937 Rubber Red Book, which will be published early in August by THE RUBBER AGE, 250 West 57th Street, New York City, is rapidly nearing completion. Statistics covering rubber manufacturers, machinery, equipment and chemical supply houses, fabric, scrap and reclaimed rubber, dealers, importers and brokers of crude rubber, etc., are being whipped into shape for inclusion in the Directory, the first to be published in the trade for more than 10 years. In addition to all of this valuable information, the Rubber Red Book will also include the Bibliography of Rubber Literature for 1936, compiled by Dr. E. A. Cable, Technical Librarian, Development Department, U. S. Rubber Products Co., Inc., the annual bibliographical compilation, the first issue of which was published as a separate volume last year. According to present estimates the Directory will consist of more than 350 pages. Included in its pages will be pertinent advertisements of practically every prominent rubber manufacturer and every leading supplier of chemicals, materials, machinery and equipment. Rubber manufacturers and suppliers of all kinds who have not yet returned their questionnaires and information blanks are urged to do so immediately to assure proper listing of company and products. Suppliers who have not yet reserved advertising space will find it advisable to send such reservations quickly to assure good position for their advertisements in the Directory.

## MIDWEST MAY ABSORB AKRON RECLAIMING CO.

If stockholders of the Midwest Rubber Reclaiming Company, St. Louis, approve a plan proposed by its officers at a meeting to be held in the near future, then Midwest will purchase the Akron Rubber Reclaiming Company, of Barberton, Ohio. Stockholders of the Akron concern approved the purchase at a meeting held on May 25.

Under the proposal, Midwest will issue to the Akron Rubber Reclaiming Company 3,027 shares of Midwest preferred stock, which is retirable at $55.00 and carries a $4.00 annual cash dividend, in addition to 14,000 shares of $5.00 par common stock. Preferred stockholders of Akron Reclaiming would receive one share of Midwest preferred and 1 1/3 shares of Midwest common for each share of Akron Reclaiming preferred stock. Common stockholders would share in a *pro rata* distribution of any other assets. The Akron firm now owns 4,896 shares of Midwest common stock.

J. B. Huber, president of Akron Rubber Reclaiming Company, which has been under lease to Midwest since January 1, 1936, told the stockholders at the May 25 meeting that the Akron plant has been operating at near capacity for more than a year. Midwest stockholders are expected to approve the purchase.

### New Firestone Factory?

Although officials refuse to make any comment, it is understood that the Firestone Tire and Rubber Company, Akron, has purchased a 90-acre tract of land near Grosse Isle, Michigan, for the purpose of building a new plant, probably to be devoted to mechanical goods production. Grosse Isle is a few miles south of Riverview, a suburb of Detroit, and is convenient to the main plant of the Ford Motor Company at River Rouge. Rumors have been rife for some time Firestone contemplated a new factory near the Ford works which absorb a good portion of the company's products.

### New Synthetic Rubber Plant

Plans have been advanced for the construction of a new German synthetic rubber factory to be located near Merseburg, Saxony. A company, known as Buna A. G., has been formed with a capitalization of approximately 12,500,000 marks, the shares of which are largely in the hands of I. G. Farbenindustrie, the German dye trust. It is believed that the factory will be ready for production late this year or early in 1938..

### Adopts Vacation Plan

Effective June 1, the National Rubber Machinery Company, Akron, adopted a vacation plan whereby all employees having been in the service of the company for one year or more will receive a week's vacation with pay. Other employees with less than one year of service will be given vacation periods with pay in proportion to time employed.

### Goodrich on Exchange

The B. F. Goodrich Company, Akron, has joined the Commodity Exchange, Inc., New York City, and will be represented by Amos D. Moss, director of purchases. Two or three other of the larger rubber manufacturers were recently admitted to Exchange membership, including Firestone.

# TRENTON NEWS

Labor difficulties at rubber factories in the Trenton area have all been ironed out and at this writing all plants are operating smoothly. Striking employees of the Thermoid Company, after being out for some time, returned to work after President Fred E. Schluter signed an agreement with the United Rubber Workers of America. The agreement provides for an increase of 3 cents an hour for men and 1 cent an hour for women employees. Piece workers earning 60 cents an hour or less will receive a 5% increase. Workers employed for four years or more will receive a week's vacation with pay.

The Thiokol Corporation, Yardville, has also signed an agreement with the union which calls for recognition on collective bargaining. Strikers at the Puritan Rubber Company returned to work on May 26 after the plant had been closed for 15 days. An agreement was entered into between company and union officials through the services of William C. Liller, Federal labor commissioner, who acted as arbitrator. Terms of the settlement were not announced.

Proceedings are under way for the reorganization of the Lambertville Rubber Company, Lambertville, under Section 77B of the National Bankruptcy Act. The Court of Chancery has appointed John T. Crowley, president of the company, as temporary trustee and creditors and stockholders have been notified that a hearing will be held shortly to determine whether he shall be named permanent trustee. The company has resumed the production of tennis shoes and boots.

Work at the Pocono Company, Trenton, was delayed for several days recently, after flames destroyed raw materials stored in a one-story building at the plant. Company employees kept the blaze under control until firemen arrived.

Production of mechanical rubber goods continues to hold up at Trenton factories, with a slight decline reported in hard rubber articles. Another 5% increase in the price of hose, the second advance this year, was recently announced.

The Rubber Manufacturers' Association of New Jersey will hold its annual outing and dinner sometime this month at the Trenton Country Club. Invitations have already been sent out by John A. Lambert, president of the Association.

## Open Malayan Laboratory

The new rubber research laboratory recently constructed at Kuala Lumpur, F.M.S., was formally opened on May 19. It is said to house equipment valued at approximately $125,000. Sir Shenton Thomas, Governor of the Straits Settlements, in an address at the opening ceremonies, stressed the importance of a close liaison between producers of crude rubber and research workers and stated that the best insurance rubber cultivators could effect against the growing competition of synthetic rubber was a cheap natural product. He also said that the Malayan government would do everything possible to maintain rubber at a reasonable price, which he estimated to be between 18 and 20 cents per pound.

## Tinsley Joins Vanderbilt

Sam Tinsley, formerly with the Coated Textile Mills, Inc., has joined the staff of the R. T. Vanderbilt Company, New York City. For the present he will confine practically all of his efforts to the sale and promotion of the company's products to the proofing industry, and will operate from both the New York offices at 230 Park Avenue, and the laboratory at Norwalk, Conn.

## Named Exposition Chairman

Dr. M. C. Whitaker, vice-president of the American Cyanamid and Chemical Company, New York City, has been named chairman of the Advisory Committee of the 16th Exposition of Chemical Industries which will be held at the Grand Central Palace in New York City on December 6 to 11. The Exposition will present a moving, colorful pageant in terms of raw materials, machinery and processes, and finished products. Principal sections will include chemicals and chemical products, metals and alloys, laboratory equipment and supplies, containers and packages, materials handling equipment, industrial chemical equipment, and machinery. Exhibits designed to explain natural resources and industrial opportunities for plant location will be included.

## Italian Synthetic Rubber

Premier Benito Mussolini has approved plans for a joint state and private company to be organized for the production of synthetic rubber. It is understood that the new company will employ German technical assistance. Italy's rearmament program has been slowed down recently because of a shortage of rubber and organization of the synthetic rubber concern is expected to obviate any such future condition.

## EXPORTS FROM JAPAN DECLINED 3% IN 1936

Japanese exports of rubber products declined 3.2% in 1936 from 1935 and 11.7% from 1933, but showed a gain of 2.2% over 1934. The total value of the 1936 exports was 40,263 yen (approximately $11,500 at the current rate of exchange), according to the Bureau of Foreign and Domestic Commerce.

Comparison of exports of principal products in 1936 with 1935 reveals the following mixed trends: rubber footwear, decline of 12%; tires (all kinds), decline of 0.3%; rubber toys, increase of 11%; hose, belting, football bladders and soft rubber sundries increased slightly; erasers, bands, threads, tennis balls and inflated balls declined slightly.

Imports of rubber products during 1936 were valued at 885,000 yen (approximately $253,000) as compared with 889,000 yen (approximately $253,400) in the previous year. Imports of automobile tires and tubes—once an important trade to the United States—amounted to 17,473 pounds in 1936 as against 21,309 pounds in 1935.

# OBITUARIES

### *Harold V. Strawn*

Harold V. Strawn, a former advertising executive of the United States Rubber Company and manager of the service and promotion department of the Audit Bureau of Circulation for the past seven years, died on June 6 at the Polyclinic Hospital in New York City of a coronary thrombosis. He was 50 years of age. Mr. Strawn served U. S. Rubber for a number of years during which period he was a resident of Scarsdale, N. Y. After leaving U. S. Rubber he acted as an advertising counselor for a number of manufacturers, including the Firestone Tire and Rubber Company. Joining the Audit Bureau of Circulation in 1930, he moved to Chicago where he lived at 1400 Lake Shore Drive. He came to New York on business a few days prior to his death. Mr. Strawn was a polo enthusiast and was well known in musical and amateur theatrical circles. He leaves a widow.

### *William Lampworth*

William Lampworth, a pioneer in elastic webbing manufacture, died on May 16 at his home in Hopedale, Massachusetts, at the age of 93. Mr. Lampworth came to Massachusetts from England 67 years ago and almost immediately established the firm of William Lampworth and Sons Company. He retired from active business only two years ago. He is survived by six sons and three daughters.

# New Rubber Goods

## Seiberling Elmer Elephant

Elmer Elephant, one of the latest Walt Disney creations, has joined the line of molded rubber novelties featured by the Seiberling Latex Prod-

ucts Company, Barberton, Ohio. The new item features blue pantaloons, a red bow-tie and a red cap perched at the top of the head. A long trunk and big, wide ears add to its appeal for children. Seiberling's line now includes Elmer Elephant, Donald Duck, Mickey Mouse, the Three Little Pigs, Pluto the Pup and the Big Bad Wolf, several of them in inflated as well as molded characters.

## Rubber Covered Softball

A rubber covered softball, produced so that it has the style and finish of a quality leather ball, has been developed by the W. J. Voit Rubber Corporation, Los Angeles, California. It is pure

white and washable, according to the manufacturer, and the seaming will not wear or pull out. The center is of long fibre kapok, yarn wound, and bonded to the cover with a latex composition. It is made in four grades and is especially recommended for night play.

## Betty and Billy Bobs

Termed "Betty and Billy Bobs," two sponge rubber bath novelties have been designed and introduced by the Rees Davis Studios, 31 West Kinzie Street, Chicago. Both characters have highly-polished celluloid faces and feature vari-

colored sponge rubber clothes, each piece of wearing apparel being held in place by gaily-colored yarn, in addition to being cemented in position. The dolls are said to stand up under the rough treatment usually given to water novelties by youngsters in their bath. Unusually attractive in appearance, the "Bobs" are reported to be meeting with favorable acceptance.

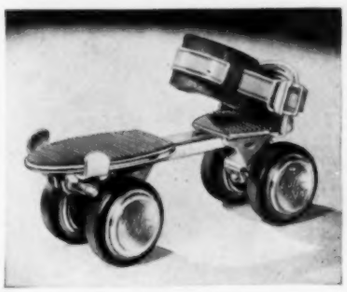
## Rubberceptor Shower Floor

A solid rubber receptor or shower stall floor, molded in one piece, has been developed by Rubberceptor, Inc., 334 East 4th Street, Los Angeles, California. Designed to be permanently installed, the construction at the top of the side wall of the Rubberceptor is such that it can be easily fitted to the

upper shower wall, making a permanent, leak-proof joint with any of the ordinary materials used in the construction of stall showers. A diamond tread is molded over the surface of the floor making the receptor slip-proof. Rubberceptors are available in various colors, are manufactured in three foot square standard size, and come equipped with 2-inch chromium-plated brass drain and solid base plates. Finishing strips are supplied on order.

## Roll King Roller Skates

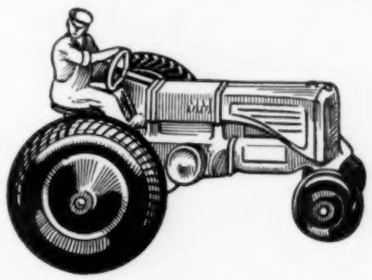
Roller skates which are cushioned in rubber and which absorb shock in three ways have been developed by the Metal Specialties Mfg. Company,



3200 Carroll Avenue, Chicago, Ill. Termed Roll King, these skates have rubber treads on the surface, preventing slipping; rubber wheels, eliminating clatter; and are equipped with rubber - mountings, giving "knee action" performance. In addition to these uses of rubber, a sponge rubber strap-guard prevents chafing of the foot. Roll Kings are described as "the biggest roller skate improvement in 20 years."

## Auburn Rubber Tractor

The Auburn Rubber Corporation, Auburn, Indiana, has added a miniature all-rubber tractor to its line. Molded in the exact form of a real tractor, this novelty is finished in



brilliant, permanent lacquer and is furnished in bright red and green colors. All Auburn wheeled items have one-piece axle construction, preventing the wheels from falling off. The all-rubber tractor sells for ten cents.

## Goodrich Pipe Lining

A special 3-ply rubber lining and flexible couplings for steel pipes used in the disposal of hot acid in strip mill pickling operations have been developed by the B. F. Goodrich Company, Akron. The new lining is said to easily withstand thermal shock of acid ranging in temperature up to 200° when it is flushed from the pickling tanks. Actual tests are reported to indicate that the flexible rubber couplings between sections of rubber-lined steel sewer pipes not only seal the joints against leakage, but also permit a reasonable amount of settling without danger of breaking.

# MARKETS

## RUBBER—COTTON AND FABRICS—CHEMICALS

**NEW YORK, JUNE, 9, 1937**

## Crude Rubber

CRUDE rubber prices have been very sensitive to developments this past month, far more than generally, and therefore severe fluctuations occurred throughout the period since our last report. In comparison with the 21.63 price for spot quoted on the Exchange on May 11 (the date of our last report) prices have dropped 315 points, reaching 18.48 today (June 9), low for the period. The apathetic attitude of both factory and dealer interests was responsible for this condition, abetted by Germany's declaration of a 100% duty on imported crude rubber, Sir Shenton Thomas' statement in favor of 18 to 20 cent rubber, and recurring reports of further labor difficulties in Akron. The price for spot broke sharply from 19.00 on June 8 to 18.48 today based on the unconfirmed rumor that Akron rubber workers would be called out to assist the steel workers to force a settlement with the independent steel producers. A downward trend is anticipated until labor diffculties both in and out of the industry, particularly that of the Ford Motor Company, are definitely ironed out. Quotations in the outside market, Exchange, London and Singapore, follow:

As of June 9

***Plantations—***

| | | | |
|---|---|---|---|
| Ribbed Smoked Sheets— | | | |
| No. 1 Spot | — | @ | .18½ |
| July-September | — | @ | .18⅝ |
| October-December | — | @ | .18⅞ |
| No. 2 | — | @ | .18⅜ |
| No. 3 | — | @ | .18¼ |
| No. 4 | — | @ | .18⅛ |
| Thin Latex Crepe | — | @ | .23½ |
| Thick Latex Crepe | — | @ | .23½ |
| Brown Crepe, No. 1 | — | @ | .17⅞ |
| Brown Crepe, No. 2 | — | @ | .17¾ |
| Amber Crepe, No. 2 | — | @ | .17⅞ |
| Amber Crepe, No. 3 | — | @ | .17¾ |
| Amber Crepe, No. 4 | — | @ | .17½ |
| Brown Crepe, Rolled | — | @ | .16⅛ |

***Latex—***

| | | | |
|---|---|---|---|
| Liquid Latex, per gal. | .68 | @ | .70 |

***Paras—***

| | | | |
|---|---|---|---|
| Up-River, fine | — | @ | .20 |
| Acre Bolivian, fine | — | @ | .20¼ |

***Balata—***

| | | | |
|---|---|---|---|
| Block, Ciudad | — | @ | .30 |

### LONDON MARKET

Standard Smoked Sheets—Buyers—June 9

| | | | |
|---|---|---|---|
| July-September | — | @ | 9 3/16d |
| October-December | — | @ | 9 5/16d |

### SINGAPORE MARKET

Standard Smoked Sheets—Sellers—June 8

| | | | |
|---|---|---|---|
| July-September | — | @ | 8 13/16d |
| October-December | — | @ | 8 15/16d |

## Reclaimed Rubber

Several revisions have been made on reclaimed rubber grades since our last report, prices declining slightly on unwashed shoe, compounded and red tube, and a few tire stocks, and increases recorded in light gravity and heavy gravity truck tire grades. Most reclaimers are still operating at near-capacity and report unabated demand from the trade. Current quotations follows:

***Shoe***

| | | | | |
|---|---|---|---|---|
| Unwashed | lb. | .07 | @ | .07¼ |
| Washed | lb. | .10 | @ | .10½ |

***Tube***

| | | | | |
|---|---|---|---|---|
| No. 1 (Floating) | lb. | .19 | @ | .19¼ |
| No. 2 (Compounded) | lb. | .10½ | @ | .11 |
| Red tube | lb. | .10½ | @ | .11 |

***Tires***

| | | | | |
|---|---|---|---|---|
| Black (acid process) | lb. | .07¼ | @ | .07½ |
| Black, selected tires | lb. | .06¼ | @ | .06½ |
| Dark Gray | lb. | .10 | @ | .10½ |
| White | lb. | .15 | @ | .15½ |
| Truck, Heavy Gravity | lb. | .06½ | @ | .07 |
| Truck, Light Gravity | lb. | .08 | @ | .08½ |

***Miscellaneous***

| | | | | |
|---|---|---|---|---|
| Mechanical blends | lb. | .04½ | @ | .05 |

## Scrap Rubber

*(Delivered Akron Mills)*

Prices have been revised upward on three grades of scrap rubber since our last report, *i.e.*, auto tire peelings, boots and shoes, and untrimmed arctics. Dealers report continued demand from reclaimers. Some grades show signs of tightening up. Current quotations follow:

(Prices to Consumers)

| | | | | |
|---|---|---|---|---|
| Auto tire peelings | ton | 25.00 | @ | — |
| Mixed auto | ton | 14.50 | @ | 15.00 |
| Beadless tires | ton | 19.00 | @ | 20.00 |
| Clean solid truck tires | ton | 28.00 | @ | 30.00 |
| Boots and shoes | ton | 22.50 | @ | 25.00 |
| Arctics, untrimmed | ton | 17.50 | @ | 21.50 |
| Inner tubes, No. 1 | lb. | .12 | @ | .13 |
| Inner tubes, No. 2 | lb. | .06½ | @ | .06⅝ |
| Inner tubes, Red | lb. | .06⅜ | @ | .06½ |

## Cotton

In the face of numerous adverse factors and in sympathy with other commodities, cotton prices have tended downward since our last report, with many decline movements temporarily halted by reports of larger crop prospects due to improved weather conditions, particularly in the southern half of the cotton belt. Adverse factors included rumors of devaluation of American gold, growing signs of overproduction of cotton goods, closing of some plants manufacturing fine goods, and indecision regarding consumption and production figures. Prices have been dropping steadily in the past ten days due to July liquidations and reached a new low for the current period today (June 9) at 12.49. High since our last report was a price of 13.36 quoted on May 20. The trade looks for an early return to better prices in the next few weeks, based on settlement of labor difficulties and National Cotton Week. Quotations for middling uplands on the N. Y. Cotton Exchange follow:

| | May 11 | June 9 | | |
|---|---|---|---|---|
| | Close | High | Low | Close |
| July | 12.77 | 12.27 | 11.93 | 11.99 |
| September | 12.62 | 12.19 | 12.19 | 12.19 |
| December | 12.52 | 12.26 | 11.93 | 11.99 |

## Tire Fabrics

(Prices Net at the Mill)

| | | | |
|---|---|---|---|
| Peeler, carded, 23/5/3 | lb. | .35¼ | @ .35½ |
| Peeler, carded, 23/4/3 | lb. | .36¼ | @ .36½ |
| Peeler, carded, 15/3/3 | lb. | .33½ | @ .33½ |
| Peeler, carded, 13/3/3 | lb. | .32¼ | @ .32½ |
| Egyptian, carded, 23/5/3 | lb. | .48¾ | @ .49 |
| Egyptian, combed, 23/5/3 | lb. | .53¾ | @ .54 |
| CHAFERS | | | |
| Carded, American, 1⅛" | lb. | .34¼ | @ .34½ |
| Carded, American, 1" | lb. | .29½ | @ .33½ |

## Sheetings

| | | | | | |
|---|---|---|---|---|---|
| 48x40 | 36 in. | 5.50 | lb. | — | @ .05⅞ |
| 40x40 | 36 in. | 6.15 | lb. | — | @ .05½ |
| 40x36 | 36 in. | 6.50 | lb. | — | @ .05⅜ |
| 48x48 | 40 in. | 2.50 | lb. | — | @ .12½ |
| 48x48 | 40 in. | 2.85 | lb. | — | @ .10⅜ |
| 56x60 | 40 in. | 3.60 | lb. | — | @ .10 |
| 48x44 | 40 in. | 3.75 | lb. | — | @ .09¼ |
| 44x40 | 40 in. | 4.25 | lb. | — | @ .08 |

## Ducks

| | | | |
|---|---|---|---|
| Enameling (single filling) | lb. | .31 | @ .34 |
| Belting and Hose | lb. | .30 | @ .31 |
| Single filling, A grade | lb. | .15½ | @ .17¼ |
| Double filling | lb. | .16¼ | @ .18½ |

## *Closing Rubber Prices on New York Commodity Exchange, Inc.*

*No. 1 Standard Contract of 10 tons*

FROM MAY 12 TO JUNE 9

| Date | | Spot | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| May | 12 | 21.44 | 21.44 | 21.52 | 21.59 | 21.60 | 21.71 | 21.74 | 21.76 | 21.78 | 21.81 | 21.83 | 21.85 | 21.85 | | 277 |
| | 13 | 20.78 | 20.80 | 20.88 | 20.95 | 21.00 | 21.05 | 21.09 | 21.12 | 21.15 | 21.16 | 21.17 | 21.19 | 21.19 | | 767 |
| | 14 | 20.88 | 20.85 | 20.93 | 21.00 | 21.06 | 21.11 | 21.13 | 21.15 | 21.17 | 21.19 | 21.21 | 21.23 | 21.23 | | 333 |
| | 15 | 20.88 | 20.85 | 20.93 | 21.00 | 21.05 | 21.10 | 21.12 | 21.14 | 21.15 | 21.17 | 21.18 | 21.19 | 21.19 | | 47 |
| | 16 | | | | | | | | | | | | | | | |
| | 17 | 20.80 | 20.71 | 20.79 | 20.86 | 20.91 | 20.95 | 20.99 | 21.03 | 21.08 | 21.11 | 21.13 | 21.15 | 21.15 | | 58 |
| | 18 | 20.73 | 20.62 | 20.69 | 20.76 | 20.85 | 20.94 | 20.96 | 20.98 | 21.00 | 21.03 | 21.05 | 21.07 | 21.07 | | 423 |
| | 19 | 21.05 | 20.94 | 21.01 | 21.08 | 21.15 | 21.21 | 21.24 | 21.26 | 21.29 | 21.32 | 21.34 | 21.36 | 21.36 | | 318 |
| | 20 | 21.03 | 20.88 | 20.95 | 21.02 | 21.09 | 21.15 | 21.19 | 21.22 | 21.24 | 21.27 | 21.29 | 21.31 | 21.31 | | 255 |
| | 21 | 21.12 | 21.06 | 21.12 | 21.18 | 21.24 | 21.30 | 21.34 | 21.38 | 21.44 | 21.47 | 21.49 | 21.51 | 21.51 | | 97 |
| | 22 | 21.06 | 21.03 | 21.08 | 21.13 | 21.20 | 21.28 | 21.31 | 21.34 | 21.38 | 21.40 | 21.42 | 21.45 | 21.45 | | 16 |
| | 23 | | | | | | | | | | | | | | | |
| | 24 | 21.03 | 20.97 | 21.00 | 21.03 | 21.10 | 21.18 | 21.25 | 21.26 | 21.28 | 21.30 | 21.32 | 21.34 | 21.34 | | 117 |
| | 25 | 20.63 | 20.59 | 20.62 | 20.65 | 20.74 | 20.83 | 20.87 | 20.90 | 20.93 | 20.95 | 20.97 | 20.99 | 20.99 | | 248 |
| | 26 | 20.73 | —— | 20.73 | 20.76 | 20.83 | 20.90 | 20.94 | 20.98 | 21.02 | 21.04 | 21.06 | 21.06 | 21.06 | | 105 |
| | 27 | 20.55 | —— | 20.55 | 20.59 | 20.64 | 20.69 | 20.73 | 20.77 | 20.81 | 20.84 | 20.88 | 20.92 | 20.92 | | 138 |
| | 28 | 20.42 | —— | 20.35 | 20.38 | 20.46 | 20.55 | 20.58 | 20.61 | 20.65 | 20.68 | 20.70 | 20.73 | 20.73 | | 234 |
| | 29 | | | | | | | | | | | | | | | |
| | 30 | | | | | | | | | | | | | | | |
| | 31 | | | | | | | | | | | | | | | |
| June | 1 | 20.10 | —— | 20.05 | 20.08 | 20.15 | 20.20 | 20.26 | 20.30 | 20.32 | 20.37 | 20.39 | 20.42 | 20.43 | 20.43 | 350 |
| | 2 | 20.37 | —— | 20.31 | 20.34 | 20.40 | 20.46 | 20.51 | 20.55 | 20.59 | 20.66 | 20.68 | 20.70 | 20.71 | 20.71 | 385 |
| | 3 | 19.60 | —— | 19.63 | 19.66 | 19.73 | 19.80 | 19.86 | 19.90 | 19.94 | 19.97 | 19.98 | 20.00 | 20.03 | 20.06 | 494 |
| | 4 | 19.81 | —— | 19.80 | 19.82 | 19.87 | 20.02 | 20.05 | 20.08 | 20.10 | 20.14 | 20.17 | 20.21 | 20.24 | 20.27 | 477 |
| | 5 | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | |
| | 7 | 18.88 | —— | 18.81 | 18.84 | 18.93 | 19.02 | 19.07 | 19.10 | 19.13 | 19.16 | 19.18 | 19.21 | 19.24 | 19.27 | 608 |
| | 8 | 19.00 | —— | 18.95 | 18.98 | 19.04 | 19.09 | 19.15 | 19.18 | 19.21 | 19.25 | 19.28 | 19.31 | 19.34 | 19.37 | 656 |
| | 9 | 18.48 | —— | 18.42 | 18.45 | 18.52 | 18.59 | 18.65 | 18.70 | 18.76 | 18.74 | 18.81 | 18.59 | 18.94 | 18.99 | 557 |

# Rubber CHEMICAL Markets

NEW YORK, JUNE 10, 1937

[All Quotations F.O.B. Works Unless Otherwise Noted]

## ACCELERATORS

| | | | |
|---|---|---|---|
| **Organic** | | | |
| A-1 (Thiocarbanilid) | lb. | .24 @ | .28 |
| A-5-10 | lb. | .33 @ | .36 |
| A-7 | lb. | .53 @ | .65 |
| A-11 | lb. | .60 @ | .75 |
| A-16 | lb. | .55 @ | .65 |
| A-19 | lb. | .56 @ | .73 |
| A-32 | lb. | .70 @ | .80 |
| A-77 | lb. | — @ | — |
| Aldehyde ammonia, crystals | lb. | .65 @ | .70 |
| Altax | lb. | — @ | — |
| Captax | lb. | | |
| Crylene | lb. | .55 @ | .65 |
| paste | lb. | .45 @ | .55 |
| Di-Ortho-Tolyguanidine | lb. | .44 @ | .47 |
| Diphenylguanidine | lb. | .35 @ | .37 |
| El-Sixty | lb. | .55 @ | .65 |
| Ethylidene aniline | lb. | .45 @ | .47½ |
| Formaldenyde aniline | lb. | .37½ @ | .42 |
| Guantal | lb. | .42 @ | .51 |
| Heptene | lb. | .40 @ | — |
| Hexamethylenetetramine | lb. | .36 @ | — |
| Lead Oleate, No. 999 | lb. | .12 @ | — |
| Witco | lb. | .12 @ | — |
| Lithex | lb. | .18 @ | .20 |
| Methylenedianiline | lb. | .36 @ | .37 |
| Monex | lb. | 3.25 @ | — |
| Oxynone | lb. | .68 @ | .80 |
| Phenex | lb. | .50 @ | .55 |
| Pipsolene | lb. | 1.60 @ | 1.85 |
| R & H 40 | lb. | .40 @ | .41 |
| R & H 50 | lb. | .40 @ | .41 |
| R-2 | lb. | 1.50 @ | 1.80 |
| Safex | lb. | 1.20 @ | 1.25 |
| SPDX | lb. | .75 @ | — |
| Super-Sulphur No. 1 | lb. | | |
| No. 2 | lb. | | |
| Thiocarbanilid, drums | lb. | .24 @ | .28 |
| Trimene | lb. | .75 @ | — |
| base | lb. | 1.20 @ | — |
| Triphenylguanidine | lb. | .58 @ | .60 |
| Tuads | lb. | | |
| Ureka | lb. | .62 @ | 1.00 |
| Ureka B | lb. | .62 @ | .75 |
| Ureka C | lb. | .58 @ | .69 |
| Vulcanex | lb. | | |
| Vulcone | lb. | | |
| Vulcanol | lb. | | |
| Z-88-P | lb. | .48 @ | .60 |
| Zimate | lb. | | |
| **Inorganic** | | | |
| Litharge, domestic | lb. | .07½ @ | .08½ |
| Magnesia, calcined, heavy | lb. | .04 @ | — |

## COLORS

**Blacks (See Compounding Materials)**

| | | | |
|---|---|---|---|
| **Blues** | | | |
| Prussian | lb. | .36 @ | .37 |
| Ultramarine | lb. | .15 @ | — |
| **Browns** | | | |
| Mapico | lb. | .13 @ | — |
| Umber, Turkey | lb | .04 @ | .04½ |
| **Greens** | | | |
| Chrome | lb. | .21 @ | — |
| Chromium Oxide, bbl. | lb. | .21 @ | — |
| Guignet's Green | lb. | .70 @ | — |
| **Reds** | | | |
| Antimony | | | |
| crimson, 15/17 | lb. | .48 @ | — |
| sulfur, free | lb. | .48 @ | .60 |
| Indian English | lb. | .09 @ | .10 |
| Domestic (Maroon) | lb. | .11 @ | — |
| Red oxide, pure | lb. | .10 @ | .12 |
| Rub-Er-Red, f.o.b. Easton | lb. | .09¼ @ | — |
| **Whites** | | | |
| Cryptone CB, No. 21 | lb. | .05¾ @ | .06 |
| Cryptone, No. 19 | lb. | .05¾ @ | .06 |
| Cryptone, ZS-20 | lb. | .09 @ | .09¼ |
| Cryptone, ZS-86 | lb. | .09 @ | .09¼ |
| Lithopone | | | |
| Albalith, black label—11 | lb. | .04¼ @ | .04½ |
| Azolith | lb. | .04¼ @ | .04½ |
| Rayox | lb. | | |
| Titanox A | lb. | .16 @ | .16¾ |
| Titanox B | lb. | .05¾ @ | .06 |
| Titanox C | lb. | .05¾ @ | .06 |
| **Zinc Oxide—American Process** | | | |
| American Azo | | | |
| ZZZ (lead free) | lb. | .05¼ @ | .05½ |
| Anaconda, lead free | lb. | .05¼ @ | .05½ |
| Horsehead Lead Free Brand: | | | |
| Special—3 | lb. | .05¼ @ | .05½ |
| XX Red—4 | lb. | .05¼ @ | .05½ |
| XX Red—72 | lb. | .05¼ @ | .05½ |
| XX Red—78 | | .05¼ @ | .05½ |
| XX Red—103 | lb. | .05¼ @ | .05½ |
| U. S. P.—7, bbls. | lb. | .05¼ @ | .05½ |
| Kadox, black label—15 | lb. | .05¼ @ | .05½ |
| Blue label—16 | lb. | .05¼ @ | .05½ |
| Red label—17 | lb. | .05¼ @ | .05½ |
| St. Joe, black label | lb. | .05¼ @ | .05½ |
| green label | lb. | .05¼ @ | .05½ |
| red label | lb. | .05¼ @ | .05½ |
| **Zinc Oxide—French Process** | | | |
| Florence White seal—7 bbls. | lb. | .06¼ @ | .07 |
| Green seal—8 | lb. | .06¼ @ | .06½ |
| Red seal—9 | lb. | .05¾ @ | .06 |
| **Yellows** | | | |
| Chrome | lb. | .14½ @ | .15½ |
| Mapico | lb. | .09½ @ | — |

## BLACKS

| | | | |
|---|---|---|---|
| Arrow "Aerfloted" Specification | lb. | .0535 @ | .0825 |
| Bone, powdered | lb. | .05½ @ | .12½ |
| Carbon, compressed | lb. | .0535 @ | .0825 |
| uncompressed | lb. | .0535 @ | .0825 |
| "Certified," Cabot | lb. | .0535 @ | .0825 |
| Spherons | lb. | .0535 @ | .0825 |
| "Disperso" | lb. | .0535 @ | .0825 |
| Drop, bbls. | lb. | .05½ @ | .14 |
| "Excello," compressed | lb. | .0535 @ | .0825 |
| "Fumonex" | lb. | .03 @ | .07 |
| "Gastex" | lb. | .03 @ | .07 |
| Lampblack | lb. | .07 @ | .12 |
| "Micronex" | lb. | .0535 @ | .0825 |
| "Supreme" | lb. | .0535 @ | .0825 |
| Thermatomic—"P 33" | lb. | — @ | — |
| "Thermax" | lb. | — @ | — |
| United "Dixie" & "Kosmos" | lb. | .0535 @ | .0825 |

## COMPOUNDING MATERIALS

| | | | |
|---|---|---|---|
| Aluminum Flake | ton. | 21.85 @ | 24.50 |
| Ammonia carbonate, lump | lb. | .10½ @ | .12 |
| Asbestine | ton | 13.00 @ | 15.00 |
| Barium carbonate (98-100%) | ton | 56.50 @ | 62.50 |
| Barium Dust | lb. | .05 @ | .06 |
| Barytes | ton | 23.65 @ | 31.15 |
| Basotor | lb. | .04½ @ | — |
| Bentonite | lb. | .02 @ | .03 |
| Blanc fixe dry f.o.b. works | ton | 60.00 @ | 65.00 |
| Calcene | ton | 37.50 @ | 45.00 |
| Catalpo (fact.) | lb. | .02 @ | — |
| Chalk, precipitated | | | |
| Suprex white, extra lt. | ton | 45.40 @ | 60.00 |
| heavy | ton | 45.00 @ | 55.00 |
| Clay, Kaolin, domestic | ton | 7.50 @ | 15.00 |
| Aerfloted, Suprex | ton | 9.00 @ | 21.00 |
| Congaree | ton | 9.00 @ | — |
| Dixie | ton | | |
| Dixie, Jr. | ton | | |
| McNamee | ton | | |
| Par | ton | | |
| Tensulite | | 15.00 @ | — |
| Witco | ton | 8.50 @ | 9.00 |
| Cotton Flock | lb. | .11 @ | .15 |
| Glues, extra white | lb. | .28 @ | .30 |
| medium white | lb. | .14 @ | .19 |
| Kalite No. 1 | ton | 30.00 @ | 55.00 |
| Kalite No. 3 | ton | 40.00 @ | 65.00 |
| "Lime Crest" Industrial Filler No. 100 | lb. | — @ | — |
| Magnesium carbonate | lb. | .08 @ | — |
| Mica | ton | 35.00 @ | 44.00 |
| Pyrax A | ton | — @ | — |
| Rottenstone (powdered) | lb. | .02½ @ | .05 |
| Soapstone, powdered | ton | 16.00 @ | 22.00 |
| Starch, powdered | cwt. | 2.90 @ | 4.10 |
| Talc, domestic | ton | 17.00 @ | 20.00 |
| Whiting, commercial | ton | 17.00 @ | 18.00 |
| Columbia Filler | ton | 9.00 @ | 14.00 |
| English Cliffstone | ton | 33.00 @ | 43.00 |
| Witco | ton | 7.00 @ | — |
| Wood Flour | ton | 20.00 @ | 25.00 |
| Zinc Carbonate | lb. | — @ | .11½ |
| Zinc Stearate | lb. | .20 @ | .23 |

## MINERAL RUBBER

| | | | |
|---|---|---|---|
| Black Diamond | ton | 27.00 @ | — |
| Genasco, solid (factory) | ton | 25.00 @ | 27.00 |
| Hard Hydrocarbon | ton | | |
| Parmr, solid | ton | 25.00 @ | — |
| Pioneer, MR, solid | ton | | |
| Pioneer-granulated | ton | | |

## SPECIALTIES

| | | | |
|---|---|---|---|
| Aromatics—Rodo | lb. | | |
| Para-Dora No. 5145 | lb. | 2.00 @ | — |
| Sunproof | lb. | .35 @ | .37½ |
| Sponge Paste | lb. | — @ | .80 |
| Tonox | lb. | .56 @ | .60 |

## SOFTENERS

| | | | |
|---|---|---|---|
| **Acids** | | | |
| Acetic, 28%, bbls. | 100 lb. | 2.53 @ | 2.78 |
| Nitric, 36 degrees | cwt. | 5.00 @ | 6.00 |
| Sulfuric, 66 degrees | ton | 15.50 @ | 16.50 |
| **Acids, Fatty** | | | |
| Laurex | lb. | 15 @ | .16 |
| Stearex Beads | lb. | .10¾ @ | .11¾ |
| Stearic, double pressed | lb. | .12½ @ | .13½ |
| Stearite | lb. | .10½ @ | .11¾ |
| **Alkalies** | | | |
| Caustic Soda, 76% | cwt. | 3.05 @ | 4.25 |
| Soda Ash, 58% C.L. | cwt. | 1.25 @ | 3.05 |

## Oils

| | | | |
|---|---|---|---|
| Cycline Oil | gal. | .20 @ | — |
| Degras, bbls. | lb. | .07¾ @ | .08 |
| Fluxrite | lb. | .05½ @ | .06½ |
| Palm Niger | lb. | .05½ @ | .06½ |
| Para-Flux | gal. | .17 @ | — |
| Petrolatum, light | lb. | .03¾ @ | .03¾ |
| Pigmentaroil, tank cars | gal. | — @ | — |
| in drums | gal. | .22½ @ | .23½ |
| Pine, steam distilled | gal. | .64 @ | .69 |
| dest. dist., drums | gal. | .49 @ | .50 |
| Rosin Oil, cmpd. | gal. | .40 @ | — |
| Rubtack | lb. | .08 @ | .10 |
| Seedine, c.l. | lb. | .07¼ @ | — |
| Tackol | lb. | .08½ @ | .18 |
| Witco Palm Oil | gal. | .07 @ | — |
| Witco Softener | gal. | .18 @ | — |
| Woburn No. 8, c.l. | lb. | .06 @ | — |
| Wobonite, c.l. | lb. | .05 @ | — |
| **Resins and Pitches** | | | |
| Pitch, Burgundy | lb. | .05½ @ | .06½ |
| coal tar | ton | 19.00 @ | 22.00 |
| hardwood | ton | 16.00 @ | 22.50 |
| pine, 200 lb. gr. wt. | bbl. | 6.00 @ | 6.50 |
| Pigmentar, tank cars | gal. | .16 @ | — |
| in drums | gal. | .22½ @ | .23½ |
| R. S. I. Resin | lb. | @ | — |
| Retort Pine Tar, drums | ton | 20.00 @ | 26.00 |
| **Solvents** | | | |
| Acetone, pure | lb. | .06 @ | .06½ |
| Alcohol, denatured, methanol, No. 1 bbls. | gal. | .33 @ | .39 |
| Benzene, 90% | gal. | .18 @ | .23 |
| Beta-Trichlorethane | gal. | — @ | — |
| Bondogen | lb. | @ | — |
| Carbon, bisulfide | lb. | .05¼ @ | .08 |
| Carbon, tetrachloride | lb. | .05¾ @ | .08 |
| Dichlorethylene | lb. | .29 @ | — |
| Dipentene, cml., drums | gal. | .41 @ | .50 |
| Dryolene (f.o.b. Okla.) | gal. | .10 @ | .10½ |
| Ethylene dichloride | lb. | .05½ @ | .06½ |
| Plastogen | lb. | | |
| Reogen | lb. | | |
| Rub-Sol (f.o.b. Okla.) | gal. | .09 @ | — |
| Trichlorethylene | lb. | — @ | .09½ |
| Turpentine, spirits | gal. | .43 @ | .47 |
| dest. dist., drums | gal. | .33 @ | .41 |
| **Waxes** | | | |
| Beeswax, white | lb. | .39 @ | .45 |
| Carnauba, yellow | lb. | .46 @ | .47½ |
| Ceresin, white, dom. | lb. | .08 @ | .11 |
| Montan, crude | lb. | .10¾ @ | .11¾ |
| **Paraffin (c.l. f.o.b. N. Y.)** | | | |
| Yellow crude scale | lb. | .02¾ @ | — |
| White crude scale 124/126 | lb. | .02¾ @ | .03 |
| Refined, 122/127 | lb. | .04½ @ | — |

## ANTI-OXIDANTS

| | | | |
|---|---|---|---|
| AgeRite, Gel | lb. | | |
| HP | lb. | | |
| Powder | lb. | | |
| Resin | lb. | | |
| White | lb. | | |
| Albasan | lb. | .70 @ | .75 |
| Antox | lb. | | |
| B. L. E. | lb. | .57 @ | .60 |
| Flectol-H | lb. | .54 @ | .65 |
| Flectol White | lb. | .95 @ | 1.15 |
| Flectol B | lb. | .54 @ | .65 |
| Neozone | lb. | | |
| Oxynone | lb. | .66 @ | .75 |
| Perfectol | lb. | .67 @ | .75 |
| Retardex | lb. | .35 @ | .40 |
| Santoflex A | lb. | — @ | — |
| Stabilite | lb. | .57 @ | .62 |
| Stabilite Alba | lb. | .70 @ | .75 |
| VGB | lb. | .55 @ | .60 |

## MOLD LUBRICANTS

| | | | |
|---|---|---|---|
| Aresklene | lb. | — @ | — |
| Cocoa Soapstock | lb. | .06 @ | .08 |
| Dipex | lb. | .06 @ | .08 |
| Lubrex | lb. | .25 @ | .30 |
| Rusco, f.o.b. Nitro | lb. | .25 @ | .30 |
| Sericite, f.o.b. N. Y. | ton | 65.00 @ | — |
| Soap Tree Bark, cut, sifted | lb. | .06 @ | .08 |

## FACTICE OR RUBBER SUBSTITUTES

| | | | |
|---|---|---|---|
| Amberex | lb. | .23 @ | — |
| Black | lb. | .08½ @ | — |
| White | lb. | .095 @ | .15 |
| Brown | lb. | .095 @ | .14 |
| Neophax | lb. | .13 @ | — |

## VULCANIZING INGREDIENTS

| | | | |
|---|---|---|---|
| Sulfur Chloride, yellow (drs.) | lb. | .02½ @ | .04 |
| Sulfur flour. | | | |
| Refined, 100% pure (bags) | cwt. | 2.55 @ | 3.65 |
| Commercial (bags) | cwt. | 1.60 @ | 2.35 |
| Telloy | lb. | | |
| Vandex | lb. | | |

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

# STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

## U. S. Imports and Exports of Crude Rubber

| YEARS | Gross Imports: Long Tons | Total Declared Value | Average Declared Value per pound Cents | Re-exports: Long Tons | Total Declared Value | Average Declared Value per pound Cents | Net Imports: Long Tons |
|---|---|---|---|---|---|---|---|
| 1922 | 301,076 | 101,843,188 | 15.10 | 4,809 | 1,921,828 | 17.84 | 296,267 |
| 1923 | 309,362 | 185,060,304 | 26.71 | 8,772 | 5,672,319 | 28.87 | 300,590 |
| 1924 | 325,899 | 173,367,272 | 23.75 | 10,309 | 6,057,637 | 26.23 | 315,590 |
| 1925 | 393,370 | 426,167,504 | 48.36 | 14,827 | 19,847,753 | 59.76 | 378,543 |
| 1926 | 409,944 | 501,131,064 | 54.57 | 17,671 | 22,470,583 | 56.77 | 392,273 |
| 1927 | 424,733 | 338,688,492 | 35.60 | 27,775 | 24,735,488 | 39.76 | 396,958 |
| 1928 | 432,633 | 242,727,423 | 25.05 | 32,159 | 18,128,761 | 25.17 | 400,474 |
| 1929 | 560,082 | 239,177,811 | 19.06 | 36,485 | 16,868,718 | 20.64 | 523,597 |
| 1930 | 482,083 | 139,133,048 | 12.88 | 30,205 | 9,310,205 | 13.76 | 451,878 |
| 1931 | 497,176 | 72,922,845 | 6.55 | 25,595 | 4,255,572 | 7.42 | 471,581 |
| 1932 | 409,556 | 31,936,459 | 3.48 | 20,930 | 2,015,612 | 4.30 | 388,626 |
| 1933 | 407,817 | 44,034,064 | 4.82 | 20,537 | 2,601,352 | 5.65 | 387,280 |
| 1934 | 449,513 | 97,929,676 | 9.73 | 23,848 | 5,770,109 | 10.80 | 425,665 |
| 1935 | 453,134 | 115,299,448 | 11.36 | 11,389 | 3,084,331 | 12.09 | 441,745 |
| 1936 | 467,064 | 152,072,496 | 14.54 | 12,581 | 4,488,223 | 15.93 | 454,483 |
| 1935: | | | | | | | |
| Oct. | 35,091 | 8,742,222 | 11.12 | 651 | 188,518 | 12.92 | 34,440 |
| Nov.* | 25,155 | 6,164,454 | 10.94 | 380 | 101,793 | 11.95 | 24,775 |
| Dec. | 38,417 | 9,930,710 | 11.54 | 1,821 | 523,997 | 12.85 | 36,596 |
| 1936: | | | | | | | |
| Jan.* | 32,310 | 8,637,997 | 11.94 | 733 | 229,129 | 13.98 | 31,577 |
| Feb. | 32,879 | 9,293,711 | 12.62 | 625 | 199,956 | 14.27 | 32,254 |
| Mar.* | 33,447 | 9,845,776 | 13.14 | 1,172 | 390,551 | 14.88 | 32,275 |
| Apr.* | 44,218 | 13,967,712 | 14.10 | 984 | 343,785 | 15.59 | 43,234 |
| May* | 35,578 | 11,460,157 | 14.38 | 1,589 | 580,021 | 16.30 | 33,989 |
| June | 36,376 | 12,073,632 | 14.82 | 2,469 | 904,669 | 16.35 | 33,907 |
| July | 38,178 | 12,763,200 | 14.92 | 1,383 | 510,075 | 16.47 | 36,795 |
| Aug. | 40,027 | 13,364,916 | 14.91 | 840 | 307,114 | 16.32 | 39,187 |
| Sept.* | 48,368 | 16,691,919 | 15.41 | 656 | 244,554 | 16.64 | 47,712 |
| Oct. | 39,573 | 13,627,465 | 15.37 | 778 | 268,645 | 15.42 | 38,795 |
| Nov.* | 36,798 | 12,790,306 | 15.52 | 675 | 241,982 | 15.99 | 36,123 |
| Dec. | 49,312 | 17,555,705 | 15.89 | 677 | 267,745 | 17.65 | 48,635 |
| 1937: | | | | | | | |
| Jan. | 42,002 | 15,408,242 | 16.38 | 844 | 372,053 | 19.69 | 41,158 |
| Feb. | 42,743 | 16,470,867 | 17.20 | 523 | 236,853 | 20.21 | 42,220 |
| Mar. | 38,682 | 16,030,267 | 18.50 | 1,146 | 522,931 | 20.37 | 37,536 |
| Apr. | 41,275 | 17,859,223 | 19.31 | 1,050 | 415,484 | 17.66 | 40,225 |

* Revised.

Note: Annual figures for 1922-1936 revised on basis of information received on February 8, 1937. Figures for 1922 and 1923 include latex; guayule is included only in 1922.

## United States Imports of Guayule, Balata, Jelutong, Liquid Latex

*(All Quantities in Long Tons)*

| | Guayule: Tons | Dollars | Balata: Tons | Dollars | Jelutong: Tons | Dollars | Liquid Latex (1): Tons | Dollars |
|---|---|---|---|---|---|---|---|---|
| 1924 | 1,356 | 536,392 | 464 | 568,456 | 6,165 | 1,237,100 | 2,157 | 864,059 |
| 1925 | 3,781 | 1,803,448 | 517 | 574,750 | 6,749 | 1,642,531 | 3,272 | 3,537,510 |
| 1926 | 4,305 | 2,562,096 | 354 | 327,213 | 7,263 | 3,127,757 | 3,394 | 4,686,743 |
| 1927 | 5,018 | 2,674,957 | 582 | 477,246 | 7,785 | 2,448,657 | 1,495 | 1,170,650 |
| 1928 | 3,077 | 1,755,685 | 731 | 430,855 | 7,552 | 2,540,059 | 4,007 | 2,121,786 |
| 1929 | 1,275 | 545,175 | 728 | 566,964 | 8,204 | 2,458,126 | 3,729 | 1,788,391 |
| 1930 | 1,096 | 347,388 | 502 | 422,684 | 5,907 | 1,403,244 | 4,458 | 1,508,786 |
| 1931 | .... | ..... | 1,207 | 411,380 | 5,777 | 1,019,010 | 4,675 | 888,909 |
| 1932 | .... | ..... | 707 | 147,403 | 4,607 | 616,596 | 5,112 | 601,999 |
| 1933 | .... | ..... | 1,659 | 2,261,869 | 5,990 | 944,895 | 11,085 | 1,833,671 |
| 1934 | 398 | 75,349 | 1,054 | 438,209 | 4,987 | 943,752 | 13,107 | 3,643,221 |
| 1935 | 459 | 86,835 | 615 | 188,384 | 5,644 | 1,063,126 | 13,553 | 3,782,222 |
| 1936 | 1,229 | 286,552 | 535 | 199,368 | 6,163 | 1,296,364 | 19,852 | 6,659,899 |
| 1936: | | | | | | | | |
| June | 97 | 18,380 | 33 | 13,671 | 767 | 186,274 | 1,897 | 657,311 |
| July | 96 | 18,168 | 44 | 15,314 | 556 | 106,676 | 1,665 | 579,895 |
| Aug. | 146 | 37,147 | 72 | 23,715 | 321 | 64,769 | 1,761 | 602,992 |
| Sept. | 106 | 29,335 | 21 | 9,846 | 418 | 85,624 | 1,800 | 692,810 |
| Oct. | 114 | 31,489 | 11 | 4,815 | 452 | 102,485 | 1,392 | 500,817 |
| Nov. | 159 | 43,980 | 43 | 19,408 | 405 | 91,538 | 1,631 | 578,729 |
| Dec. | 134 | 36,972 | 14 | 7,247 | 538 | 109,208 | 2,070 | 735,156 |
| 1937: | | | | | | | | |
| Jan. | 160 | 44,166 | 10 | 4,348 | 247 | 56,056 | 1,337 | 535,546 |
| Feb. | 206 | 56,807 | 14 | 5,838 | 242 | 61,741 | 1,973 | 775,202 |
| Mar. | 136 | 37,453 | 29 | 13,949 | 898 | 187,413 | 2,216 | 968,053 |
| Apr. | 190 | 52,361 | 3 | 1,457 | 617 | 135,412 | 1,633 | 724,757 |

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

## U. S. Consumption of Crude Rubber

*(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)*
*(All Quantities in Long Tons)*

| | Figures on Monthly Basis: 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936* | 1937 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 36,194 | 28,557 | 29,648 | 22,645* | 39,190* | 46,636* | 48,631 | 50,818* |
| Feb. | 33,302 | 28,797 | 31,821 | 21,392* | 40,515* | 42,720* | 36,841 | 51,887* |
| Mar. | 35,540 | 32,788 | 29,505 | 17,483* | 47,003* | 42,153* | 42,813 | 54,064* |
| Apr. | 39,686 | 33,321 | 27,518 | 25,928 | 44,853* | 44,247* | 52,031 | 51,797 |
| May | 39,386 | 37,817 | 30,957 | 44,074 | 42,918* | 41,101* | 50,612 | ..... |
| June | 34,195 | 37,916 | 41,475 | 50,743* | 40,147* | 36,156* | 52,772 | ..... |
| July | 29,508 | 31,397 | 29,976 | 49,614* | 32,553* | 35,917* | 48,250 | ..... |
| Aug. | 30,850 | 27,586 | 23,721 | 44,428* | 33,216* | 38,775* | 46,777 | ..... |
| Sept. | 25,515 | 23,638 | 23,847 | 35,281* | 30,258* | 37,086* | 46,449 | ..... |
| Oct. | 27,516 | 22,277 | 22,286 | 31,543* | 31,253* | 41,969* | 49,637 | ..... |
| Nov. | 23,691 | 22,943 | 23,231 | 28,831* | 34,748* | 42,310* | 50,433 | ..... |
| Dec. | 21,687 | 21,409 | 18,015 | 28,757* | 36,569* | 42,474* | 49,754 | ..... |
| Tot. | 375,980 | 348,986 | 332,000 | 400,719* | 453,223* | 491,544* | 575,000 | ..... |

* Revised.

Note: Figures for 1936 were revised on May 15, 1937, and are now based on Department of Commerce survey figures.

## Reclaimed Rubber in the United States

*(All Quantities in Long Tons)*

| Year | Production | Consumption: Tons | % to Crude | Stocks[a] | Year | Production | Consumption: Tons | % to Crude | Stocks[a] |
|---|---|---|---|---|---|---|---|---|---|
| 1927 | 189,144 | 178,471 | 47.6 | 24,980 | 1932 | 75,608 | 77,504 | 23.4 | 16,334 |
| 1928 | 208,516 | 223,000 | 50.4 | 24,785 | 1933 | 99,560 | 81,602 | 19.9 | 20,746 |
| 1929 | 218,954 | 226,583 | 48.4 | 27,464 | 1934 | 110,010 | 100,597 | 22.2 | 23,079 |
| 1930 | 157,967 | 153,497 | 40.8 | 22,000 | 1935 | 122,948 | 113,078* | 23.0* | 25,069 |
| 1931 | 133,351 | 124,126 | 33.9 | 19,257 | 1936 | 150,571 | 130,048 | 22.7 | 30,573 |
| | Figures on Monthly Basis | | | | | | | | |
| 1936*: | | | | | | | | | |
| Jan. | 11,665 | 10,922 | 22.5 | 17,171 | July | 12,330 | 12,856 | 26.6 | 16,207 |
| Feb. | 10,188 | 8,014 | 21.8 | 18,890 | Aug. | 12,856 | 11,959 | 25.6 | 16,487 |
| Mar. | 10,712 | 9,539 | 22.3 | 19,472 | Sept. | 12,959 | 12,153 | 26.2 | 16,711 |
| Apr. | 11,382 | 11,241 | 21.6 | 19,024 | Oct. | 14,737 | 13,715 | 27.6 | 17,141 |
| May | 11,512 | 11,311 | 22.3 | 18,590 | Nov. | 14,357 | 13,087 | 25.9 | 17,900 |
| June | 11,935 | 12,563 | 23.8 | 17,366 | Dec. | 15,938 | 14,126 | 28.4 | 19,006 |
| 1937: | | | | | | | | | |
| Jan.* | 15,129 | 14,450 | 28.4 | 18,822 | July | ..... | ..... | ... | ..... |
| Feb.* | 15,192 | 14,578 | 28.1 | 18,490 | Aug. | ..... | ..... | ... | ..... |
| Mar.* | 14,462 | 15,601 | 28.9 | 16,450 | Sept. | ..... | ..... | ... | ..... |
| Apr. | 13,884 | 15,607 | 30.1 | 14,046 | Oct. | ..... | ..... | ... | ..... |
| May | ..... | ..... | ... | ..... | Nov. | ..... | ..... | ... | ..... |
| June | ..... | ..... | ... | ..... | Dec. | ..... | ..... | ... | ..... |

[a] Stocks on hand at the end of month or year.
* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

## U. S. Consumption of Gasoline

*(Bureau of Mines Statistics)*
*(In Thousands of Barrels of 42 Gallons)*

| | 1935 | 1936 | 1937 | | 1935 | 1936 | 1937 |
|---|---|---|---|---|---|---|---|
| January | 28,147* | 32,412* | 33,696 | August | 43,097* | 46,081 | ..... |
| February | 26,580* | 27,216* | 32,000 | September | 37,976* | 44,346 | ..... |
| March | 32,272* | 35,871 | 40,561 | October | 41,566* | 44,253 | ..... |
| April | 36,363* | 38,825 | 43,409 | November | 35,991* | 39,919 | ..... |
| May | 39,381* | 42,007 | ..... | December | 33,872* | 39,393 | ..... |
| June | 38,086* | 44,630 | ..... | | | | |
| July | 41,479* | 46,638* | ..... | Total | 434,810* | 481,591 | ..... |

* Revised.

## Rims Inspected and Passed in U. S.

*(Tire and Rim Association Reports)*

| | Total | | Total | | Total |
|---|---|---|---|---|---|
| 1925 ..... | 26,001,664 | 1929 ..... | 24,141,502 | 1933 ..... | 8,713,962 |
| 1926 ..... | 24,199,524 | 1930 ..... | 17,364,096 | 1934 ..... | 12,255,118 |
| 1927 ..... | 19,700,003 | 1931 ..... | 11,253,800 | 1935 ..... | 18,664,356 |
| 1928 ..... | 24,247,282 | 1932 ..... | 6,261,336 | 1936 ..... | 20,790,098 |

| 1937: | | 1937: | | 1937: | |
|---|---|---|---|---|---|
| January ... | 2,123,723 | May ..... | 2,189,502 | September .. | ..... |
| February .. | 2,022,258 | June ..... | ..... | October ... | ..... |
| March ..... | 2,166,218 | July ..... | ..... | November .. | ..... |
| April ..... | 2,269,680 | August .... | ..... | December .. | ..... |

## Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Ave. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| February | 12¾ | 12¾ | —— | 12¾ | 12¾ | 12⅝ | 12⅝ | 13⅛ | 13⅛ | —— | —— | —— | 13 | 13 | 13 | 12⅞ | —— | 13⅛ | 13⅛ | 13⅛ | 13⅛ | —— | 13⅛ | —— | —— | 12¾ | 12¾ | 12⅝ | —— | —— | —— | 12⅝ |
| March | 12⅜ | 12⅜ | —— | 12⅜ | 12⅜ | 12⅝ | 12⅝ | 12⅞ | 12 | —— | 11¾ | 11¾ | 11⅝ | 12 | 11⅞ | 11⅝ | —— | 10⅝ | 10⅞ | 11⅛ | 10⅝ | 10⅛ | 10⅝ | 10½ | 11¼ | 11¼ | 11¼ | 11½ | —— | —— | —— | 11½ |
| April | 11⅛ | 11⅛ | 11¼ | 11⅛ | 11 | 11 | 11⅛ | 10⅞ | 11⅜ | 11½ | 11⅛ | 11⅛ | 12 | 12⅛ | 12⅛ | 12⅛ | 11⅞ | 11⅛ | 11⅛ | 11⅛ | 12⅛ | 11⅞ | 11⅛ | 11⅛ | 11⅛ | 11⅛ | 11⅛ | 11⅛ | 11⅛ | 11⅛ | —— | 11⅛ |
| May | 11½ | 11½ | 11⅞ | 11½ | 11½ | 11½ | 11⅜ | 11⅜ | 11⅜ | 11⅛ | 11⅛ | 11⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅜ | 12⅜ | 12⅛ | 12⅛ | 12⅛ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ |
| June | 12⅛ | 12⅛ | 12⅛ | 12½ | 12½ | 12½ | 12⅜ | 12⅜ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ | 12⅜ |
| July | 12⅜ | 12¾ | 12¾ | —— | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12¾ | 12¾ | 12¾ | 12¾ | 12¾ | 12¾ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ | 12⅝ |
| August | 12⅞ | 12¾ | 11½ | 11½ | 11½ | 12⅝ | 11⅞ | 12⅝ | 12 | 11⅞ | 11⅞ | 12⅛ | 11⅞ | 11⅞ | 12 | 11⅞ | 11⅞ | 11⅞ | 11⅞ | 11½ | 12 | 12 | 12 | 12 | 11⅞ | 11⅞ | 11⅞ | 11⅞ | 11⅞ | 11⅞ | 12⅛ | 12 |
| September | 11⅜ | 11⅜ | 11⅜ | 11⅜ | 11⅜ | 11⅝ | 11⅝ | 12⅛ | 11½ | 12⅛ | 12⅛ | 12⅛ | 12⅛ | 11⅝ | 12⅛ | 12⅛ | 12⅛ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ | 11⅝ |
| October | 11⅜ | 11⅜ | 12 | 13⅛ | 12⅝ | 12⅝ | 12⅝ | 13⅛ | 12¾ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13 | 13 | 13 | 13 | 13 | 13 | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ |
| November | 13⅛ | 13⅛ | 12⅜ | 12⅝ | 13 | 13⅛ | 13⅛ | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ | 13⅛ |
| December | —— | 13⅛ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1936 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| January | —— | 13½ | 13⅝ | 13⅝ | 13⅝ | 13¾ | 13⅛ | 13⅛ | 13⅜ | 14 | 14⅛ | —— | 13 | 14⅛ | 14⅛ | 14⅞ | 14⅞ | 14⅞ | 14⅛ | 14⅜ | 14⅜ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ | 14⅛ |
| February | 15⅛ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅝ | 15⅞ | 15⅞ | 15⅜ | 15⅜ | 15⅜ | —— | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ | 15⅝ |
| March | —— | —— | 15⅝ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ |
| April | —— | —— | 15⅝ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ |
| May | —— | —— | 15⅝ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ |
| June | —— | —— | 15⅝ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ | 15⅜ |
| July | —— | —— | 16⅞ | 16⅜ | 16⅜ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ |
| Aug. | —— | —— | 16⅞ | 16⅜ | 16⅜ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ |
| Sept. | —— | —— | 16⅞ | 16⅜ | 16⅜ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ |
| Oct. | —— | —— | 16⅞ | 16⅜ | 16⅜ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ | 16⅛ |
| Nov. | —— | —— | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ | 17⅛ |
| Dec. | —— | 18½ | 18⅝ | 19 | 19⅛ | —— | 19⅝ | 19⅛ | 19⅛ | 19⅛ | 19 | 19 | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ | 19⅛ |
| 1937 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Jan. | —— | —— | 20⅛ | 20⅜ | 20⅜ | 21⅛ | 21⅛ | 21⅛ | 22⅛ | 22⅛ | 22⅛ | 22⅛ | 22 | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | 21⅞ | —— | 21⅜ |
| Feb. | —— | 21 | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | 21⅝ | —— | 21⅜ |
| Mar. | —— | 21⅛ | 21⅛ | 21⅛ | 21⅛ | 22⅛ | 22⅛ | 22⅛ | 22⅜ | 23⅜ | 23⅜ | 23⅜ | 23⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | —— | 23⅜ |
| April | —— | 26⅜ | 26⅜ | 26⅜ | 25¾ | 24⅞ | 24⅞ | 24⅞ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 24⅜ | 26⅜ | 24⅜ |
| May | —— | 21 | 21 | 21 | 21½ | 21⅛ | 21⅛ | 21⅛ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 22½ | 26½ | 23½ |
| June | —— | 20⅛ | 19⅛ | 19⅛ | —— | —— | 18⅞ | 19⅛ | 18½ | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— |

## Average Spot Closing Prices— Ribbed Smoked Sheets

*(New York Market)*

### Average Price per Pound for Years 1910-1929

| Year | Cents | Year | Cents | Year | Cents | Year | Cents | Year | Cents |
|---|---|---|---|---|---|---|---|---|---|
| 1910 | 206.60 | 1914 | 65.33 | 1918 | 60.15 | 1922 | 17.50 | 1926 | 48.50 |
| 1911 | 141.30 | 1915 | 65.85 | 1919 | 48.70 | 1923 | 29.45 | 1927 | 37.72 |
| 1912 | 121.60 | 1916 | 72.50 | 1920 | 36.30 | 1924 | 26.20 | 1928 | 22.48 |
| 1913 | 82.04 | 1917 | 72.23 | 1921 | 16.36 | 1925 | 72.46 | 1929 | 20.55 |

### Average Monthly Price per Pound Since 1930

| | 1930 Cents | 1931 Cents | 1932 Cents | 1933 Cents | 1934 Cents | 1935 Cents | 1936 Cents | 1937 Cents |
|---|---|---|---|---|---|---|---|---|
| Jan. | 15.24 | 8.34 | 4.38 | 3.08 | 9.32 | 13.10 | 14.35 | 21.37 |
| Feb. | 15.85 | 7.70 | 4.03 | 2.95 | 10.45 | 12.92 | 15.48 | 21.33 |
| Mar. | 15.34 | 7.71 | 3.35 | 3.01 | 11.01 | 11.51 | 15.89 | 24.09 |
| Apr. | 14.93 | 6.43 | 3.02 | 3.56 | 12.10 | 11.55 | 15.98 | 23.44 |
| May | 14.24 | 6.49 | 3.09 | 4.95 | 13.26 | 12.05 | 15.62 | 21.14 |
| June | 12.45 | 6.35 | 2.66 | 6.15 | 13.51 | 12.57 | 15.85 | |
| July | 11.24 | 6.37 | 2.89 | 8.01 | 14.60 | 12.10 | 16.49 | |
| Aug. | 9.96 | 5.38 | 3.63 | 7.31 | 15.47 | 11.98 | 16.25 | |
| Sept. | 8.28 | 5.08 | 3.84 | 7.30 | 15.36 | 11.55 | 16.46 | |
| Oct. | 8.20 | 4.87 | 3.65 | 7.64 | 13.96 | 12.62 | 16.55 | |
| Nov. | 9.01 | 4.65 | 3.44 | 8.66 | 13.04 | 13.15 | 17.97 | |
| Dec. | 9.05 | 4.64 | 3.24 | 8.87 | 12.98 | 13.28 | 20.01 | |
| Average for Year | 11.98 | 6.17 | 3.49 | 5.96 | 12.92 | 12.37 | 16.41 | |

## London Closing Prices of Ribbed Smoked Sheets

*(In Pence Per Pound)*

| Day | 1937 Mar. | 1937 Apr. | 1937 May | 1937 June | Day | 1937 Mar. | 1937 Apr. | 1937 May | 1937 June |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10¾ | 13⅜ | 10 1/16 | 9 1/16 | 17 | 12⅝ | 10⅞ | —— | |
| 2 | 10¾ | 13 | —— | 10 | 18 | 12⅛ | —— | 10 | |
| 3 | 10¾ | 13 1/16 | 10 1/16 | 9 1/16 | 19 | 12¼ | 11 1/16 | 10¼ | |
| 4 | 10¾ | —— | 10 1/16 | 9⅜ | 20 | 12⅛ | 10 1/16 | 10 1/16 | |
| 5 | 10⅛ | 12⅛ | 10⅜ | —— | 21 | —— | 11¼ | 10¼ | |
| 6 | 11⅛ | 12⅝ | 10⅜ | —— | 22 | 12 1/16 | 11⅜ | 10¼ | |
| 7 | —— | 12⅛ | 10¾ | 9⅝ | 23 | 12⅛ | 11⅛ | —— | |
| 8 | 11½ | 12⅜ | 10⅛ | 9⅜ | 24 | 12½ | 11¼ | 10 1/16 | |
| 9 | 11⅞ | 11⅛ | —— | 9⅛ | 25 | 12⅛ | —— | 10 1/16 | |
| 10 | 11⅛ | 12 1/16 | 10⅜ | —— | 26 | —— | 10⅛ | 10 1/16 | |
| 11 | 11½ | —— | 10⅜ | —— | 27 | —— | 10¾ | 10 | |
| 12 | 11⅞ | 11½ | —— | —— | 28 | —— | 10⅛ | 10 | |
| 13 | 11½ | 11⅞ | 10¼ | —— | 29 | —— | 10 | 10 | |
| 14 | —— | 11⅞ | —— | —— | 30 | 13⅛ | 10 | —— | |
| 15 | 11⅜ | 10⅛ | —— | —— | 31 | 13¼ | —— | 9⅛ | |
| 16 | 12¼ | 10⅞ | —— | —— | | | | | |

### Average Monthly Price Per Pound

| Month | 1934 Pence | 1935 Pence | 1936 Pence | 1937 Pence | Month | 1934 Pence | 1935 Pence | 1936 Pence | 1937 Pence |
|---|---|---|---|---|---|---|---|---|---|
| Jan. | 4.429 | 6.434 | 6.758 | 10.378 | Aug. | 7.401 | 5.696 | 7.581 | |
| Feb. | 4.920 | 6.292 | 7.255 | 10.503 | Sept. | 7.409 | 5.508 | 7.577 | |
| Mar. | 5.136 | 5.745 | 7.450 | 11.766 | Oct. | 6.806 | 6.130 | 7.898 | |
| Apr. | 5.712 | 5.604 | 7.502 | 11.471 | Nov. | 6.294 | 6.308 | 8.572 | |
| May | 6.207 | 5.822 | 7.335 | 10.250 | Dec. | 6.295 | 6.340 | 9.580 | |
| June | 6.245 | 6.027 | 7.352 | | Average for Year | 6.159 | 5.976 | 7.713 | |
| July | 7.053 | 5.801 | 7.696 | | | | | | |

## Spot Closing Cotton Prices

*(Middling Upland Grade—New York Market)*

### Recent Daily Price Per Pound

| Date | 1937 Apr. | 1937 May | 1937 June | Date | 1937 Apr. | 1937 May | 1937 June | Date | 1937 Apr. | 1937 May | 1937 June |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15.17 | 13.41 | 13.22 | 11 | —— | 13.26 | | 22 | 13.86 | 13.34 | |
| 2 | 14.98 | —— | 13.25 | 12 | 14.49 | 13.31 | | 23 | 13.79 | —— | |
| 3 | 15.06 | 13.50 | 13.19 | 13 | 14.40 | 13.12 | | 24 | 13.85 | 13.30 | |
| 4 | —— | 13.55 | 13.20 | 14 | 14.36 | 13.18 | | 25 | —— | 13.16 | |
| 5 | 15.08 | 13.65 | 13.24 | 15 | 14.13 | 13.26 | | 26 | 13.58 | 13.16 | |
| 6 | 14.96 | 13.62 | —— | 16 | 13.84 | —— | | 27 | 13.72 | 13.27 | |
| 7 | 14.67 | 13.58 | 12.79 | 17 | 13.99 | 13.16 | | 28 | 13.55 | 13.30 | |
| 8 | 14.80 | 13.58 | 12.69 | 18 | —— | 13.27 | | 29 | 13.26 | —— | |
| 9 | 14.59 | —— | 12.49 | 19 | 13.85 | 13.27 | | 30 | 13.51 | —— | |
| 10 | 14.53 | 13.40 | | 20 | 13.97 | 13.36 | | 31 | —— | —— | |
| | | | | 21 | 14.06 | 13.25 | | | | | |

### Average Monthly Price Per Pound

| | 1934 Cents | 1935 Cents | 1936 Cents | 1937 Cents | | 1934 Cents | 1935 Cents | 1936 Cents | 1937 Cents |
|---|---|---|---|---|---|---|---|---|---|
| Jan. | 11.25 | 12.70 | 11.91 | 13.06 | Aug. | 13.40 | 11.48 | 12.28 | |
| Feb. | 12.28 | 12.58 | 11.53 | 13.15 | Sept. | 13.00 | 10.80 | 12.31 | |
| Mar. | 12.30 | 11.63 | 11.43 | 14.46 | Oct. | 12.48 | 11.28 | 12.30 | |
| Apr. | 11.80 | 11.73 | 11.71 | 14.23 | Nov. | 12.53 | 12.01 | 12.23 | |
| May | 11.44 | 12.25 | 11.68 | 13.34 | Dec. | 12.76 | 11.99 | 12.83 | |
| June | 12.20 | 11.89 | 12.02 | | Average for Year | 12.36 | 11.88 | 12.11 | |
| July | 12.84 | 12.26 | 13.11 | | | | | | |

# World Stocks of Crude Rubber

*(All figures are in long tons)*

## ON HAND OR AFLOAT TO THE U. S.

| At End of | ON HAND 1935 | ON HAND 1936 | ON HAND 1937 | AFLOAT 1935 | AFLOAT 1936 | AFLOAT 1937 | ON HAND AND AFLOAT 1935 | ON HAND AND AFLOAT 1936 | ON HAND AND AFLOAT 1937 |
|---|---|---|---|---|---|---|---|---|---|
| Jan. | 349,446 | 285,054* | 201,915 | 42,066 | 43,870 | 55,096 | 391,512 | 328,924* | 257,011 |
| Feb. | 340,264 | 282,9?2* | 193,864 | 42,969 | 46,532 | 53,538 | 383,233 | 329,434* | 247,402 |
| Mar. | 340,284 | 276,823* | 191,928* | 44,485 | 58,935 | 56,994 | 384,769 | 335,758* | 248,922* |
| Apr. | 337,586 | 277,478* | 174,934 | 37,651 | 47,678 | 72,530 | 375,237 | 325,156* | 247,464 |
| May | 322,558 | 248,317 | | 44,375 | 48,860 | | 366,933 | 297,177 | |
| June | 324,218 | 245,886 | | 55,581 | 47,228 | | 379,799 | 293,114 | |
| July | 334,692 | 234,498 | | 49,018 | 60,343 | | 383,710 | 294,841 | |
| Aug. | 334,106 | 229,056 | | 47,724 | 63,597 | | 381,830 | 292,653 | |
| Sept. | 331,121 | 228,477 | | 43,413 | 62,240 | | 374,534 | 290,717 | |
| Oct. | 322,857 | 219,553 | | 49,913 | 67,825 | | 371,770 | 287,378 | |
| Nov. | 308,993 | 212,515 | | 46,588 | 73,691 | | 355,581 | 286,206 | |
| Dec. | 303,000 | 218,844 | | 39,094 | 56,567 | | 342,094 | 275,411 | |

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

Note: Complete figures for 1934 and 1935 were revised by the R.M.A. on May 1, 1936.

## STOCKS IN GREAT BRITAIN

*(No. of Tons in Wharves and Warehouses, not including Latex)*

| At end of | London 1935 | London 1936 | London 1937 | Liverpool 1935 | Liverpool 1936 | Liverpool 1937 |
|---|---|---|---|---|---|---|
| January | 81,807 | 84,791 | 29,005 | 66,405 | 77,188 | 41,895 |
| February | 87,605 | 79,757 | 26,508 | 67,983 | 77,138 | 37,078 |
| March | 92,664 | 74,779 | 21,292 | 69,218 | 72,823 | 30,622 |
| April | 94,361 | 68,932 | 21,128 | 70,584 | 71,388 | 27,443 |
| May | 95,722 | 61,349 | | 71,927 | 69,150 | |
| June | 98,077 | 55,993 | | 73,131 | 66,173 | |
| July | 99,226 | 49,575 | | 74,915 | 63,715 | |
| August | 101,574 | 45,749 | | 75,584 | 62,367 | |
| September | 101,198 | 44,364 | | 76,263 | 59,485 | |
| October | 94,749 | 40,777 | | 76,400 | 55,738 | |
| November | 90,542 | 37,495 | | 76,301 | 51,184 | |
| December | 86,551 | 33,027 | | 77,589 | 45,291 | |

*(Figures from the Rubber Trade Association of London)*

## STOCKS IN OTHER CENTRES

*(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)*

| | Penang and Singapore [1] | Malaya [2] | Ceylon [2] | Holland | Para and Manaos |
|---|---|---|---|---|---|
| At end of 1936 | | | | | |
| May | 26,687 | 33,179 | 3,379* | 1,360 | 4,522 |
| June | 28,260 | 34,166 | 3,057 | 1,070 | 4,502 |
| July | 29,443 | 34,395 | 3,610 | 1,026 | 4,696 |
| August | 28,289 | 34,849 | 3,961 | 979 | 1,742* |
| September | 26,936 | 33,351 | 3,930 | 911 | 1,817 |
| October | 24,593 | 34,941 | 3,490 | 773 | 1,820 |
| November | 26,761 | 33,469 | 3,415 | 588 | 1,948 |
| December | 26,969 | 35,145 | 5,161 | 409 | 2,454 |
| At end of 1937 | | | | | |
| January | 36,365 | 41,911 | 5,024 | 290 | 4,005 |
| February | 42,132 | 44,346 | 5,855 | 197 | 3,763 |
| March | 42,485 | | 3,477 | | 4,078 |

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

## RUBBER STOCKS AFLOAT

| End of: 1936: | Afloat for United States | Afloat for Europe | All Other * Afloat | Total * Afloat |
|---|---|---|---|---|
| April | 47,678 | 17,025 | 18,297 | 83,000 |
| May | 48,860 | 18,670 | 21,470 | 89,000 |
| June | 47,228 | 20,200 | 22,572 | 90,000 |
| July | 60,343 | 20,300 | 25,357 | 106,000 |
| August | 63,597 | 19,800 | 15,603 | 99,000 |
| September | 62,240 | 18,090 | 15,670 | 96,000 |
| October | 67,825 | 20,790 | 17,385 | 106,000 |
| November | 73,691 | 19,270 | 13,039 | 106,000 |
| December | 56,567 | 24,800 | 21,633 | 103,000 |
| End of: 1937 | | | | |
| January | 55,096 | 24,920 | 17,984 | 98,000 |
| February | 53,538 | 27,250 | 13,212 | 94,000 |
| March | 56,994 | 30,000P | 38,006 | 125,000 |
| April | 72,530 | 30,000P | 21,470 | 124,000 |

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

## TOTAL WORLD STOCKS

*(Figures from the Survey of Current Business)*

| At end of | 1932 | 1933 | 1934 | 1935 | 1936* | 1937 |
|---|---|---|---|---|---|---|
| January | 623,416* | 634,797 | 661,948 | 698,153 | 600,479 | 454,249* |
| February | 611,819* | 626,227 | 663,308 | 686,195 | 599,355 | 435,265* |
| March | 614,894* | 638,428 | 666,382 | 678,809 | 583,318 | 448,879 |
| April | 615,893* | 629,159 | 658,796 | 677,006 | 567,172 | ..... |
| May | 612,474* | 626,537 | 689,239 | 677,569 | 541,871 | ..... |
| June | 595,712 | 613,055 | 672,804 | 671,525 | 520,255 | ..... |
| July | 589,037 | 618,258 | 676,200 | 679,061 | 519,074 | ..... |
| August | 597,274 | 617,449 | 674,702 | 680,644 | 500,520 | ..... |
| September | 599,986 | 623,683 | 694,361 | 661,509 | 493,585 | ..... |
| October | 609,368 | 636,597 | 680,616 | 655,000 | 486,159 | ..... |
| November | 614,342 | 642,968 | 684,408 | 617,300* | 466,491 | ..... |
| December | 629,898 | 654,890 | 705,975 | 613,987* | 466,576 | ..... |
| Monthly Avge. | 609,502* | 630,171 | 677,395 | 666,397* | 528,738 | ..... |

* Revised.

# U. S. Tire and Tube Statistics[1]

*(All Figures Represent Thousands)*

## AUTOMOBILE CASINGS

### Figures for Recent Years

| | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 |
|---|---|---|---|---|---|---|---|---|
| Production | 68,726 | 50,965 | 48,740 | 40,085 | 45,303 | 47,233 | 49,362 | 58,116 |
| Shipments | 69,395 | 53,638 | 50,061 | 40,251 | 44,094 | 46,687 | 50,183 | 55,363 |
| Inventory [2] | 11,838 | 9,003 | 7,775 | 7,644 | 8,888 | 9,455 | 8,196 | 11,114 |

### Figures for Recent Months

| | PRODUCTION 1935 | PRODUCTION 1936* | PRODUCTION 1937 | SHIPMENTS 1935 | SHIPMENTS 1936* | SHIPMENTS 1937 | INVENTORY 1935 | INVENTORY 1936* | INVENTORY 1937 |
|---|---|---|---|---|---|---|---|---|---|
| Jan. | 4,626 | 4,579 | 4,980 | 3,663 | 3,875 | 4,509 | 10,398 | 8,917 | 11,377 |
| Feb. | 4,383 | 3,579 | 5,246 | 3,287 | 3,212 | 4,371 | 11,530 | 9,265 | 12,308 |
| Mar. | 4,346 | 3,640 | 5,916 | 4,204 | 3,857 | 5,787 | 11,675 | 9,087 | 12,448 |
| Apr. | 4,512 | 4,857 | | 5,144 | 4,904 | | 11,003 | 9,035 | |
| May | 4,175 | 4,974 | | 4,067 | 5,833 | | 11,131 | 8,178 | |
| June | 3,910 | 5,612 | | 4,262 | 5,793 | | 10,755 | 7,835 | |
| July | 3,532 | 5,466 | | 5,447 | 5,744 | | 8,850 | 7,750 | |
| Aug. | 3,993 | 5,017 | | 4,739 | 4,977 | | 7,805 | 7,799 | |
| Sept. | 3,787 | 4,984 | | 3,303 | 3,837 | | 8,288 | 9,012 | |
| Oct. | 4,051 | 5,126 | | 4,055 | 4,082 | | 8,291 | 10,096 | |
| Nov. | 3,997 | 4,972 | | 3,930 | 4,233 | | 8,249 | 10,823 | |
| Dec. | 4,051 | 5,311 | | 4,081 | 5,016 | | 8,196 | 11,114 | |

## AUTOMOBILE INNER TUBES

### Figures for Recent Years

| | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 |
|---|---|---|---|---|---|---|---|---|
| Production | 68,829 | 52,420 | 48,333 | 36,891 | 42,556 | 46,228 | 47,879 | 57,607 |
| Shipments | 70,592 | 54,938 | 50,021 | 37,911 | 41,391 | 45,046 | 48,067 | 54,626 |
| Inventory [3] | 12,807 | 9,999 | 7,922 | 6,749 | 7,815 | 9,180 | 8,231 | 10,985 |

### Figures for Recent Months

| | PRODUCTION 1935 | PRODUCTION 1936 | PRODUCTION 1937 | SHIPMENTS 1935 | SHIPMENTS 1936 | SHIPMENTS 1937 | INVENTORY 1935 | INVENTORY 1936 | INVENTORY 1937 |
|---|---|---|---|---|---|---|---|---|---|
| Jan. | 4,259 | 4,592 | 4,801 | 3,722 | 4,168 | 4,391 | 9,621 | 8,623 | 11,100 |
| Feb. | 4,171 | 3,556 | 5,091 | 3,362 | 3,446 | 4,536 | 10,466 | 8,699 | 11,734 |
| Mar. | 4,123 | 3,787 | 5,823 | 4,168 | 3,796 | 5,570 | 10,406 | 8,692 | 11,904 |
| Apr. | 4,259 | 4,824 | | 4,453 | 4,746 | | 10,170 | 8,788 | |
| May | 3,892 | 4,819 | | 3,451 | 4,919 | | 10,615 | 8,719 | |
| June | 3,480 | 5,035 | | 4,024 | 5,504 | | 10,050 | 8,105 | |
| July | 3,251 | 5,177 | | 5,269 | 5,758 | | 8,005 | 7,725 | |
| Aug. | 3,894 | 5,039 | | 4,556 | 5,136 | | 6,939 | 7,621 | |
| Sept. | 4,125 | 5,161 | | 3,426 | 4,231 | | 7,565 | 8,627 | |
| Oct. | 4,435 | 5,397 | | 3,987 | 4,108 | | 8,053 | 9,977 | |
| Nov. | 3,942 | 4,739 | | 3,687 | 3,995 | | 8,161 | 10,732 | |
| Dec. | 4,048 | 5,121 | | 3,962 | 4,819 | | 8,231 | 10,985 | |

(1) These figures have been adjusted to represent 100% of the industry based on reports received by the Rubber Manufacturers' Association which represent 80% for 1931-1932-1933; 97% for 1934-1935; 81% for 1936. All figures through September, 1936, were revised in December, 1936. Annual figures are more accurate.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

# Automobile Production

| | United States Total | United States Passenger Cars | United States Trucks | Canada Total | Canada Passenger Cars | Canada Trucks | Grand Total |
|---|---|---|---|---|---|---|---|
| 1928 | 4,357,384 | 3,826,613 | 530,771 | 242,382 | 196,737 | 45,645 | 4,599,944 |
| 1929 | 5,358,420 | 4,587,400 | 771,020 | 263,295 | 207,498 | 55,797 | 5,621,715 |
| 1930 | 3,355,986 | 2,814,452 | 540,534 | 154,192 | 125,442 | 28,750 | 3,510,178 |
| 1931 | 2,389,730 | 1,973,090 | 416,640 | 82,621 | 63,477 | 19,144 | 2,472,351 |
| 1932 | 1,370,678 | 1,135,493 | 235,187 | 60,816 | 50,718 | 10,098 | 1,431,494 |
| 1933* | 1,920,057 | 1,573,512 | 346,545 | 65,924 | 53,855 | 12,069 | 1,992,128 |
| 1934* | 2,753,111 | 2,177,919 | 575,192 | 116,852 | 92,647 | 24,205 | 2,869,963 |
| 1935* | 3,946,934 | 3,252,244 | 694,690 | 172,877 | 135,562 | 37,315 | 4,119,811 |
| 1936* | 4,454,115 | 3,669,528 | 784,587 | 162,322 | 131,308 | 31,014 | 4,616,437 |
| 1936 | | | | | | | |
| May* | 460,512 | 384,921 | 75,591 | 20,006 | 16,389 | 3,617 | 480,518 |
| June* | 452,968 | 375,337 | 77,631 | 16,400 | 13,126 | 3,274 | 469,368 |
| July* | 440,731 | 371,922 | 68,809 | 10,475 | 8,192 | 2,833 | 451,206 |
| Aug.* | 271,274 | 209,351 | 61,923 | 4,660 | 3,051 | 1,609 | 275,934 |
| Sept.* | 135,165 | 90,101 | 45,064 | 4,655 | 2,481 | 2,174 | 139,820 |
| Oct.* | 224,688 | 190,242 | 34,446 | 5,361 | 4,592 | 769 | 230,049 |
| Nov.* | 394,987 | 341,085 | 53,902 | 10,812 | 10,086 | 726 | 405,799 |
| Dec.* | 498,710 | 425,365 | 73,345 | 20,411 | 16,542 | 3,869 | 519,121 |
| 1937 | | | | | | | |
| Jan.* | 380,051 | 309,637 | 70,414 | 19,583 | 15,009 | 4,574 | 399,634 |
| Feb.* | 363,991 | 296,636 | 67,355 | 19,707 | 14,415 | 5,292 | 383,698 |
| Mar.* | 494,276 | 403,879 | 90,397 | 24,701 | 19,313 | 5,388 | 518,977 |
| Apr. | 536,334 | 429,980 | 96,354 | 17,081 | 12,927 | 4,154 | 553,415 |

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

# Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

| | BRITISH MALAYA [1] | | | | | | | DUTCH EAST INDIES [2] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gross Exports | Imports | Gross Exports Minus Imports | Ceylon [3] | India & Burma [4] | Sarawak [4] | British North Borneo [3] | Siam [4] | Java & Madura | Sumatra E. Coast | Other D.E.I. | Indo-China [4] | Amazon Valley | All Other [4] | World Total [5] |
| 1923 | 252,016 | 70,432 | 181,584 | 39,971 | 6,416 | 5,705 | 4,237 | 1,718 | 32,930 | 46,344 | 37,822 | 5,067 | 16,765 | 7,856 | 406,415 |
| 1924 | 259,706 | 108,524 | 151,182 | 39,997 | 7,697 | 6,699 | 4,621 | 2,962 | 42,446 | 54,497 | 80,347 | 6,688 | 23,165 | 9,065 | 429,366 |
| 1925 | 316,825 | 158,022 | 158,803 | 49,566 | 10,082 | 5,424 | 5,377 | 5,377 | 46,757 | 65,499 | 120,626 | 7,881 | 25,298 | 13,797 | 514,487 |
| 1926 | 391,328 | 151,243 | 240,085 | 58,962 | 9,874 | 9,155 | 6,079 | 4,027 | 52,186 | 71,413 | 121,231 | 8,203 | 24,298 | 16,017 | 621,530 |
| 1927 | 371,322 | 182,845 | 188,477 | 55,356 | 11,321 | 10,923 | 6,582 | 5,472 | 35,297 | 77,815 | 142,171 | 8,645 | 28,782 | 15,633 | 606,474 |
| 1928 | 409,430 | 149,787 | 259,643 | 57,267 | 10,790 | 10,087 | 6,698 | 4,813 | 58,848 | 82,511 | 121,770 | 9,548 | 21,129 | 10,690 | 653,794 |
| 1929 | 574,836 | 163,092 | 411,744 | 81,384 | 11,663 | 11,077 | 7,381 | 5,018 | 65,990 | 87,789 | 134,037 | 9,696 | 21,148 | 6,767 | 853,894 |
| 1930 | 547,043 | 133,876 | 413,167 | 76,970 | 10,782 | 10,309 | 6,781 | 4,251 | 69,755 | 79,396 | 115,254 | 7,665 | 14,260 | 5,651 | 814,241 |
| 1931 | 519,740 | 125,506 | 394,234 | 61,769 | 8,470 | 10,451 | 6,247 | 4,218 | 75,952 | 87,747 | 116,009 | 11,696 | 12,121 | 3,294 | 792,203 |
| 1932 | 478,252 | 92,539 | 385,713 | 48,973 | 3,888 | 6,960 | 4,664 | 3,451 | 61,312 | 79,837 | 85,871 | 13,883 | 6,450 | 1,816 | 702,818 |
| 1933 | 573,412 | 167,377 | 406,035 | 63,351 | 4,527 | 10,874 | 7,555 | 7,765 | 73,851 | 91,861 | 149,659 | 18,394 | 9,883 | 2,737 | 846,312 |
| 1934 | 677,361 | 211,803 | 465,558 | 79,746 | 10,492 | 17,233 | 11,103 | 17,545 | 87,400 | 112,058 | 175,470 | 20,170 | 8,903 | 2,985 | 1,008,663 |
| 1935 | 590,319 | 174,652 | 415,667 | 54,316 | 13,968 | 19,465 | 8,885 | 28,327 | 57,488 | 78,325 | 139,297 | 28,816 | 11,275 | 8,745 | 864,574 |
| 1936 | 520,286 | 167,799 | 352,487 | 49,692 | 14,724 | 21,243 | 8,177 | 33,702 | 61,307 | 84,577 | 152,205 | 40,782 | 14,193 | 11,466 | 845,431 |
| 1935: | | | | | | | | | | | | | | | |
| Aug. | 51,873 | 10,978 | 40,895 | 5,683 | 565 | 772 | 566 | 2,328 | 4,660 | 6,923 | 9,087 | 2,433 | 1,150 | 725 | 75,787 |
| Sept. | 51,247 | 10,365 | 40,882 | 4,053 | 710 | 1,758 | 421 | 1,949 | 4,089 | 5,862 | 9,637 | 2,601 | 1,121 | 669 | 73,752 |
| Oct. | 48,258 | 19,364 | 28,894 | 5,932 | 1,284 | 1,684 | 1,040 | 2,679 | 3,937 | 6,711 | 16,818 | 2,260 | 1,292 | 714 | 73,245 |
| Nov. | 43,147 | 10,518 | 32,629 | 4,288 | 2,273 | 1,141 | 455 | 2,303 | 3,724 | 3,818 | 8,863 | 2,445 | 907 | 876 | 63,722 |
| Dec. | 37,838 | 7,529 | 30,309 | 4,942 | 3,028 | 1,233 | 171 | 3,079 | 3,881 | 5,206 | 3,854 | 4,532 | 1,352 | 1,122 | 62,709 |
| 1936: | | | | | | | | | | | | | | | |
| Jan. | 39,101 | 12,582 | 26,519 | 4,178 | 1,299 | 2,317 | 938 | 1,665 | 4,315 | 6,347 | 9,381 | 2,449 | 1,606 | 839 | 61,853 |
| Feb. | 38,436 | 18,857 | 19,579 | 3,664 | 1,382 | 2,107 | 529 | 3,663 | 4,789 | 6,643 | 15,851 | 2,892 | 1,201 | 1,051 | 63,353 |
| Mar. | 46,552 | 12,026 | 34,526 | 4,336 | 1,324 | 1,848 | 342 | 2,966 | 4,484 | 5,052 | 9,225 | 2,553 | 1,264 | 751 | 68,671 |
| Apr. | 36,251 | 14,702 | 21,549 | 3,172 | 1,230 | 2,053 | 869 | 1,596 | 4,895 | 6,446 | 13,032 | 2,416 | 1,056 | 947 | 59,261 |
| May | 46,568 | 12,527 | 34,041 | 2,560 | 1,117 | 2,354 | 517 | 2,077 | 4,258 | 6,015 | 10,766 | 2,281 | 956 | 776 | 67,718 |
| June | 40,049 | 15,026 | 25,023 | 3,766 | 1,226 | 1,386 | 461 | 3,737 | 4,577 | 6,519 | 14,588 | 2,733 | 917 | 823 | 65,756 |
| July | 53,114 | 19,038 | 34,076 | 3,773 | 1,359 | 1,399 | 1,035 | 3,734 | 6,133 | 8,578 | 17,946 | 2,738 | 964 | 933 | 82,668 |
| Aug. | 43,506 | 13,361 | 30,145 | 3,940 | 776 | 2,541 | 656 | 3,284 | 4,978 | 7,353 | 12,106 | 3,017 | 542 | 1,054 | 70,392 |
| Sept. | 44,110 | 10,039 | 34,071 | 5,367 | 664 | 1,139 | 537 | 3,259 | 4,531 | 6,241 | 10,175 | 3,505 | 1,119 | 937 | 71,545 |
| Oct. | 46,543 | 12,960 | 33,583 | 5,599 | 1,181 | 2,143 | 1,086 | 3,349 | 6,477 | 8,145 | 12,881 | 3,874 | 1,255 | 1,105 | 80,678 |
| Nov. | 47,342 | 16,923 | 30,419 | 4,960 | 1,322 | 1,950 | 701 | 2,260 | 5,398 | 7,109 | 16,718 | 3,872 | 1,592 | 1,163 | 77,464 |
| Dec. | 38,714 | 9,758 | 28,956 | 4,377 | 1,844 | | 506 | 2,988 | 6,472 | 10,129 | 9,536 | 8,450 | 1,721 | 1,087 | 76,072 |
| 1937: | | | | | | | | | | | | | | | |
| Jan. | 41,571 | 16,956 | 24,615 | 4,541 | 1,077 | 4,063 | 1,234 | 3,849 | 5,136 | 8,011 | 13,102 | 2,828 | 1,271 | 1,000* | 70,727 |
| Feb. | 38,058 | 14,048 | 24,010 | 5,619 | 1,831 | 2,043 | 790 | 3,554 | 5,484 | 7,656 | 12,414 | 3,074 | 1,692 | 1,000* | 69,167 |
| Mar. | 59,568 | 19,579 | 39,989 | 7,066 | 2,040 | 1,425 | 1,239 | 3,873 | 7,791 | 11,848 | 19,969 | 3,173 | 1,749 | 1,000* | 101,162 |
| Apr. | 58,718 | 17,136 | 41,582 | 3,423 | 1,200* | 2,960 | 783 | 1,899 | 6,999 | 8,967 | 15,989 | 2,094 | 1,700* | 1,000* | 88,596 |
| May | 51,152 | 17,350 | 33,802 | | | | | | | | | | | | |

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

# Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

| | United States [1] | United Kingdom | France (h) | Germany | Canada (ac) | Japan (da) | Italy | Russia (ce) | Australia (cd) | Belgium (d) | Netherlands | Scandinavia (abcdf) | Spain (g) | Czechoslovakia (abcd) | World Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1919 | 238,407 | 42,671 | 17,685 | 5,584 | 6,395 | 9,753 | 9,894 | 75 | 1,002 | 3,995 | 2,771 | 3,149 | 2,418 | 9 | 343,808 |
| 1920 | 249,530 | 56,844 | 13,885 | 11,890 | 11,746 | 5,297 | 6,123 | 62 | 1,815 | 3,840 | 5,510 | 2,292 | 2,008 | 567 | 371,409 |
| 1921 | 179,736 | 42,087 | 15,135 | 21,920 | 8,124 | 21,713 | 3,906 | 165 | 1,014 | 1,705 | 1,022 | 1,279 | 2,245 | 569 | 300,620 |
| 1922 | 296,594 | 11,724 | 24,352 | 27,546 | 9,207 | 15,934 | 6,430 | 2,493 | 2,643 | 172 | —3,807 | 1,778 | 589 | 567 | 396,222 |
| 1923 | 301,527 | 12,700 | 27,392 | 18,519 | 13,277 | 15,372 | 8,489 | 2,986 | 1,649 | 2,184 | 792 | 2,528 | 630 | 1,128 | 409,173 |
| 1924 | 319,103 | —11,550 | 30,446 | 22,727 | 14,299 | 19,571 | 8,764 | 2,346 | 3,124 | 2,688 | —807 | 3,178 | 944 | 1,370 | 416,203 |
| 1925 | 385,596 | 4,061 | 32,956 | 33,937 | 19,683 | 11,117 | 11,412 | 7,088 | 4,757 | 2,930 | 875 | 3,149 | 1,155 | 1,558 | 520,274 |
| 1926 | 399,981 | 84,865 | 34,240 | 22,775 | 20,229 | 18,125 | 9,809 | 6,529 | 9,021 | 2,498 | 2,670 | 4,046 | 1,299 | 1,870 | 617,957 |
| 1927 | 403,472 | 60,249 | 34,271 | 38,892 | 26,405 | 20,521 | 11,381 | 12,018 | 9,490 | 6,482 | 636 | 4,224 | 2,055 | 2,672 | 632,768 |
| 1928 | 407,572 | 4,846 | 36,498 | 37,855 | 30,447 | 25,621 | 12,433 | 15,134 | 8,430 | 7,958 | 2,243 | 4,418 | 3,178 | 3,138 | 599,771 |
| 1929 | 528,608 | 122,675 | 55,093 | 49,275 | 35,453 | 34,284 | 17,169 | 11,774 | 15,886 | 9,443 | 3,022 | 6,440 | 864 | 4,650 | 894,638 |
| 1930 | 458,036 | 120,069 | 68,503 | 45,488 | 28,793 | 33,039 | 18,639 | 16,387 | 5,354 | 10,635 | 2,924 | 7,710 | 2,400 | 4,468 | 822,445 |
| 1931 | 475,993 | 86,170 | 46,466 | 39,688 | 25,261 | 43,483 | 10,149 | 30,671 | 7,649 | 11,009 | 2,220 | 6,360 | 2,605 | 7,717 | 794,641 |
| 1932 | 393,844 | 44,086 | 42,506 | 45,121 | 20,917 | 56,027 | 14,469 | 30,637 | 12,576 | 9,519 | 2,851 | 7,262 | 4,359 | 9,444 | 693,618 |
| 1933 | 398,365 | 73,335 | 61,953 | 54,120 | 19,332 | 66,831 | 19,341 | 29,830 | 13,534 | 11,166 | 1,243 | 7,831 | 5,520 | 10,402 | 772,803 |
| 1934 | 439,172 | 158,482 | 49,560 | 59,330 | 28,439 | 69,905 | 21,398 | 47,271 | 9,642 | 9,115 | 3,758 | 12,418 | 6,900 | 10,999 | 926,389 |
| 1935 | 455,758 | 128,829 | 51,450 | 62,899 | 26,870 | 57,567 | 21,880 | 37,572 | 9,978 | 7,593 | 4,068 | 11,878 | 8,140 | 11,245 | 895,727 |
| 1936 | 475,359 | —2,591 | 57,032 | 71,794 | 27,871 | 61,223 | 17,000* | 30,967 | 14,109 | 9,648 | 2,888 | 11,236 | 6,668 | 8,772 | 791,976 |
| 1936: | | | | | | | | | | | | | | | |
| Jan. | 33,260 | 4,573 | 6,755 | 5,545 | 1,759 | 4,355 | 1,500* | 467 | 1,260 | 760 | 369 | 736 | 664 | 767 | 62,770 |
| Feb. | 33,789 | 1,271 | 6,264 | 5,257 | 1,900 | 2,786 | 1,000* | 94 | 735 | 799 | 106 | 497 | 1,312 | 344 | 56,154 |
| Mar. | 33,743 | —1,227 | 4,333 | 4,569 | 1,811 | 5,170 | 1,000* | 4,376 | 819 | 1,033 | 339 | 754 | 1,113 | 410 | 58,243 |
| April | 44,948 | 2,097 | 4,250 | 5,497 | 1,079 | 4,929 | 1,500* | 3,251 | 919 | 1,097 | 238 | 848 | 679 | 603 | 71,935 |
| May | 35,549 | 302 | 4,335 | 4,639 | 2,221 | 5,531 | 1,000* | 4,220 | 1,034 | 698 | 103 | 657 | 500* | 667 | 61,456 |
| June | 35,901 | —1,493 | 4,846 | 5,698 | 2,042 | 4,567 | 1,500* | 2,427 | 1,635 | 579 | —27 | 650 | 500* | 323 | 59,148 |
| July | 38,556 | —766 | 4,621 | 6,837 | 2,274 | 5,126 | 2,000* | 1,733 | 1,363 | 713 | 183 | 1,094 | 500* | 495 | 64,729 |
| Aug. | 41,094 | —1,581 | 4,513 | 6,556 | 3,781 | 4,305 | 1,500* | 3,128 | 807 | 789 | 42 | 1,145 | 500* | 989 | 67,440 |
| Sept. | 49,483 | —12 | 4,393 | 6,006 | 2,393 | 5,195 | 1,500* | 2,922 | 2,297 | 514 | 471 | 1,090 | 300* | 624 | 77,176 |
| Oct. | 40,301 | —87 | 4,752 | 7,232 | 3,110 | 6,600 | 1,500* | 2,761 | 1,092 | 817 | 343 | 1,171 | 200* | 1,026 | 70,818 |
| Nov. | 37,897 | —742 | 3,282 | 6,500 | 4,308 | 3,961 | 1,500* | 2,162 | 964 | 1,090 | 445 | 1,388 | 200* | 823 | 63,778 |
| Dec. | 50,838 | —4,926 | 4,688 | 7,458 | 1,193 | 8,698 | 1,500* | 3,426 | 1,184 | 759 | 276 | 1,206 | 200* | 1,701 | 78,201 |
| 1937: | | | | | | | | | | | | | | | |
| Jan. | 42,655 | 33 | 4,430 | 7,041 | 1,632 | 8,357 | 2,000* | 2,633 | 582 | 854 | 269 | 1,115 | 200* | 567 | 72,368 |
| Feb. | 44,398 | —222 | 5,296 | 7,911 | 1,271 | 6,630 | 1,500* | 3,048 | 304 | 1,363 | 245 | 452 | 200* | 837 | 73,233 |
| Mar. | 39,888 | 343 | 5,347 | 7,668 | 2,612 | 6,935 | 2,119 | 3,000* | 1,293 | 1,641 | 371 | 709 | 200* | 601 | 72,727 |
| Apr. | 42,066 | 3,808 | | 8,664 | | 5,837 | | | 1,058 | | 362 | | | | |

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 1 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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